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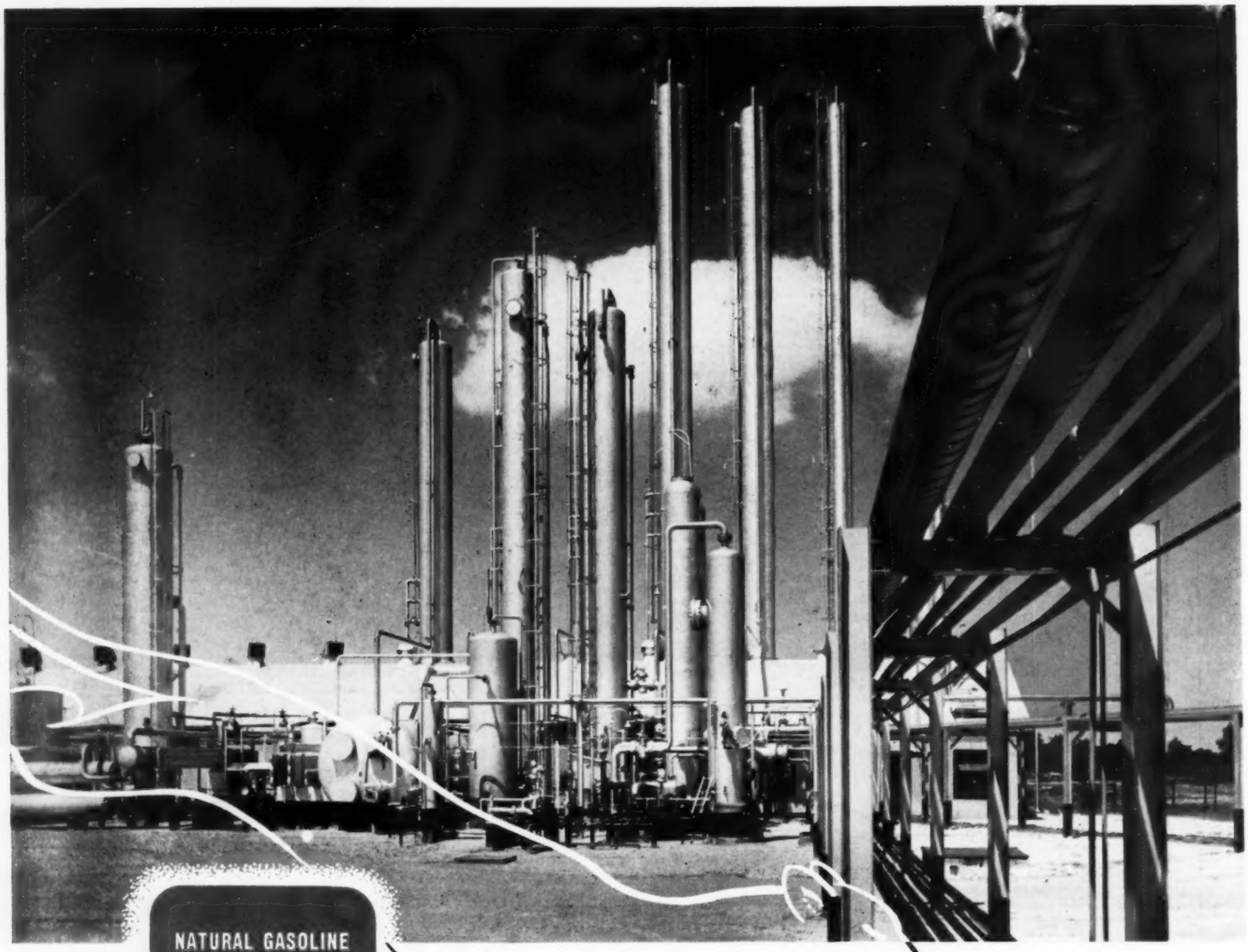

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Founded by Russell Palmer

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CONTENTS

VOLUME 19 JULY, 1948 NUMBER 7

Oil Industry's Record is Answer to Attacks 37

Hemispheric Oil Policy Needed 38

Preventive Medicine at Talara 41

Round the World to Palembang 42

Pipe Line Aids Development of Venezuelan States 47

Oil's Outlook in Former India Uncertain 48

Gas Turbines and Jet Propulsion 50

Portable Rotary Table 54

Asphalt Plant at Stanovan 55

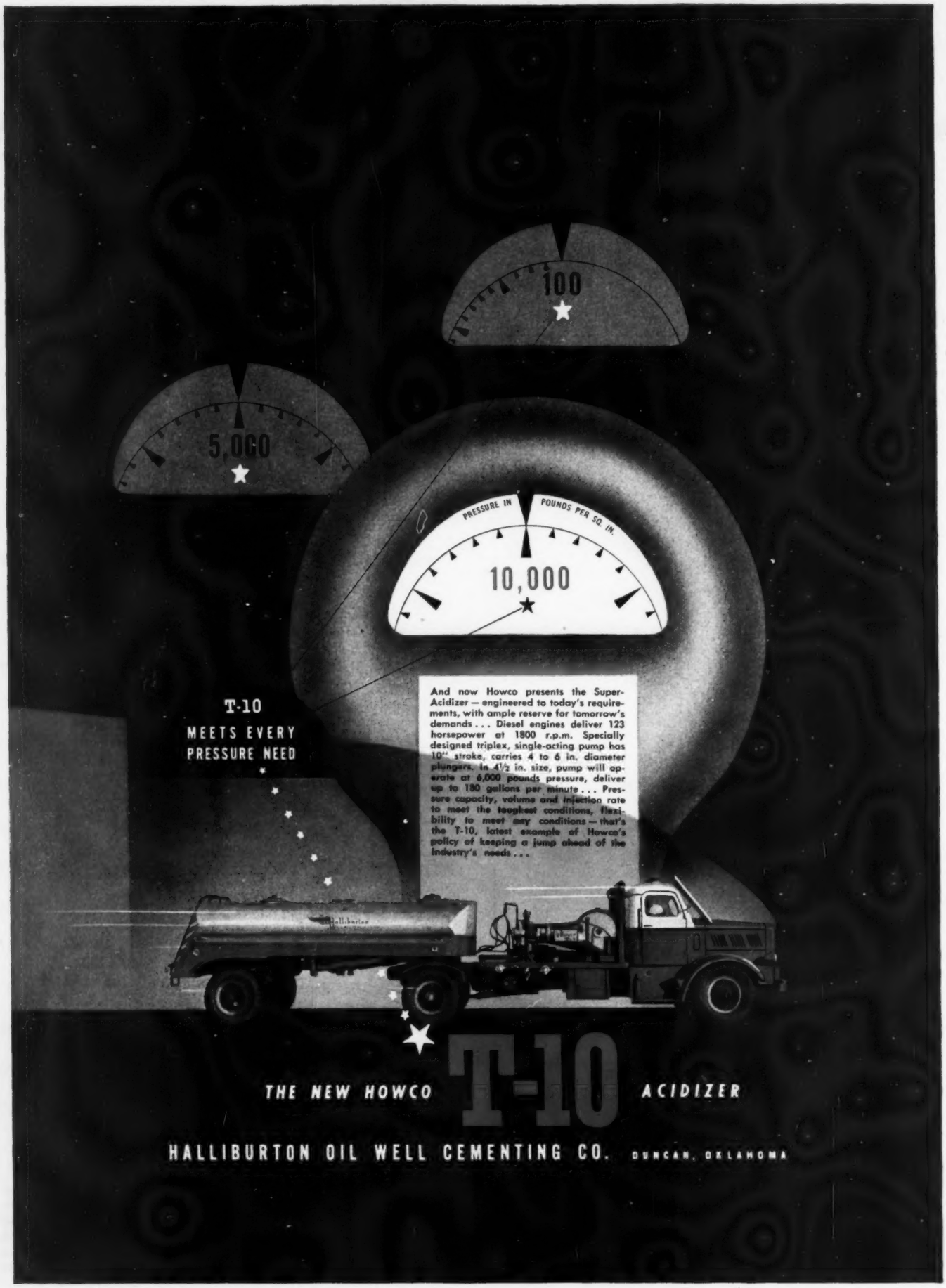
New System Aids Marine Surveys 56

International Notes 58

Oil Company Changes 60

Montebello Field Well Again Perforated 66

THIS MONTH'S COVER —Gravity meter station in Concordia Parish, Louisiana. During the survey in this area tripods were used for many gravity meter stations although water in the Cocodrie and Dismal swamps was as much as 15 feet deep in the rainy season. When working among the cypress trees firm platforms could be built as shown in the photograph by Martha Roberts for Standard Oil Co. (N.J.). Bill Low, party chief for Carter Oil Co. is in the skiff recording data from readings by David Newell. Color plates published through courtesy of The Carter Oil Co., Tulsa.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EDITORIAL

OIL INDUSTRY'S RECORD IS ANSWER TO ATTACKS

INVESTIGATIONS of the oil industry have long been one of the favorite indoor sports of the national legislature of the United States. In this respect the past session of Congress has established what must be close to a new high record in the volume of verbiage recorded and in the variety of topics to which the numerous committees and subcommittees of both houses have directed their attention. Such questions as the policy of the nation toward the development of oil resources by its citizens in other parts of the world, various measures of federal regulation of production, transportation and consumption, reports of shortages and discrimination in deliveries to distributors, allegations of waste in wartime operations, state versus federal authority over offshore exploration and production, the entry of the government itself into the construction and operation of synthetic plants are a few of the many questions to which thousands of hours of hearings and billions of words of testimony have been devoted. The net result in constructive legislation has been practically nil, but some otherwise obscure members of Congress have obtained a measure of publicity that they could not have achieved otherwise.

Even the suspension of legislative activity between sessions combined with the distractions of a presidential campaign are not expected to suspend the operations of some of these eager probers. Some half dozen committees or subcommittees are planning to hold sessions in various parts of the country during the summer. Apparently they will be engaged mostly in threshing over old straw while incidentally providing vacation travel and a political sounding-board for their members.

Proposals to alter the structure of the oil industry and to invest it with the static character of a public utility have by no means been limited to Congress. Supporters of the theory that state management of business is superior to private enterprise, a theory by which government officeholders seem often to be infected, have taken up predictions of an approaching failure of petroleum supplies as an opportunity to propose the imposition of more direct federal regulation. The Department of Justice, estopped by the grim necessities of war from its projected broadside assault upon the industry, has returned to this happy hunting ground with a less spectacular campaign of regional attacks which apparently are considered more effective in producing the desired result.

Always there are the theorists whose avocation is to point out alleged flaws in the American system of industrial organization and whose thesis seems to be that conspicuous success is in itself evidence of criminality against the public interest. One of the recent emanations of this sort, the work of a Yale law professor, is devoted to the oil industry, which is indicted as being monopolistic in effect though outwardly competitive. Its keynote is provided by the statement that "the bigness of the big integrated oil companies is a device to permit them to obtain the profits and security of monopoly; it has substantially nothing to do with their efficiency or their costs." The author's remedy is to separate the integrated organizations into separate entities, dividing them first horizontally by divorcing production, transportation, refining and marketing, permitting no company to engage in more than one of these occupations, and chopping these dismembered parts into still smaller fractions if necessary. While the book abounds in erroneous statements and conclusions, such as the assertion that the monthly forecasts of probable demand issued by the Bureau of Mines "operate to control prices by controlling supply", its apparent objective is to convince the reader that the oil industry as a whole is wasteful, inefficient, aimed solely at the extraction of inordinate profits and in need of being placed under the rigorous hand of national control extending to all its operations. A typical passage is that relating to conservation. "If we were really serious about conserving our oil supply," it says, "we would eliminate our oil tariffs; we would use foreign oil in peacetime, and perhaps have a holiday in one or more areas of production, keeping the American oil extraction industry as a model plant, and a standby for defense purposes; we would mix gasoline with alcohol made from grain; and we would discourage production by a horsepower tax, and perhaps by a prohibition against using oil where coal or water power would do. But we are not really serious about oil conservation." To this last statement, one is tempted to add: Thank God we are not if this is the way it is to be obtained.

To these various attacks the oil industry is making a most conclusive reply by doing its job day by day, pushing up production to meet the rapid rise in demand, spending thousands of millions of dollars to find new sources of supply, to improve its products and to develop others that serve a public need. Its shortcoming, if any, has lain in failure to keep the general public adequately informed of its operations, and it appears now to be in the way of remedying this oversight. As our broadcasters are fond of saying, "Freedom is everybody's business." It is a form of business that members of the oil industry need to work at persistently.

HEMISPHERIC OIL POLICY NEEDED

By Ruth Sheldon

Broadcast by members of International Petroleum Congress. Left to right, Dr. Jose Martorano, Ing. I. J. Teitlebaum, Dr. Carlos Alzamora, Ruth Sheldon Knowles, Ing. Carlos Vegh Garzon, and John Henry.

THE need for agreement on a workable set of "ground rules" for the development of western hemisphere oil is daily growing more urgent. In terms of hemispheric security alone, it is a critical problem demanding solution, and of equal importance is the increased prosperity and stability which would result for all participating countries.

The possibilities of reaching such an agreement are by no means remote, but the depth and breadth of cleavage between North and Latin American thinking, which must be bridged, and the slowness with which that bridge building is being engineered on both sides were clearly brought out at the International Petroleum Congress held in conjunction with the recent International Petroleum Exposition in Tulsa.

Although the Congress was simply a series of forums and addresses and as yet has no formal organization or objectives, it was of particular interest in that it is the first time since prewar days that oil men throughout the world have had an opportunity to gather to exchange ideas and discuss the future. Over 650 foreign delegates from Latin America, Europe and the Far East attended the Exposition, but the Congress' agenda was devoted to western hemisphere petroleum developments.

North American interest in the southern half of the hemisphere always has been keen, as witness the fact that 42 percent of the foreign petroleum assets of the United States companies lie in South America alone. Today that interest is vital as the United States finds itself becoming a net importing nation, with world consumption steadily increasing, and the western hemisphere at its present development level unable to supply an extraordinary increase in demand as it was able to do during the late war. With new oil discoveries in the United States becoming increasingly difficult and costly, development of the only partially explored resources of Latin America offers a secure and feasible solution to the supply problem of the western hemisphere; hence the urgency for agreement on an adequate hemispheric policy and program.

This major question was provided a dramatic backdrop by the spectacular Exposition itself with its $100,000,000 display of equipment, new devices and techniques. It left even experienced oil men tongue-tied in expression of praise as to what the industry can do technically in finding, producing and refining oil.

Furthermore it was undoubtedly the most concentrated and remarkable demonstration in the world today of what an industry can do and how it can expand in the climate of free enterprise. Nobody pretends that North American scientists or engineers are genetically superior to those of other countries. The physical materials with which they work are the same the world over. The inescapable conclusion is that their astonishing progress is due to an honestly competitive system of free enterprise unhampered by the restrictions of statism.

Secretary of Interior Krug in his speech formally opening the Exposition made special reference to the merits of this "climate" by pointedly reminding his listeners that "the inter-American cooperation which resulted in initial development of South and Central American fields has been attained almost entirely through private enterprise."

He then suggested that "it is wise and sound business now for local capital to become interested in oil development in those areas" and that a number of such cooperative arrangements have already been made. Secretary Krug did not expand on what he meant by "local capital," but he obviously did not refer to private "local capital"—for to date there just isn't that type of oil money in Latin America. Latin American private businessmen who have invested in oil in their own countries can be counted on less than one's fingers. What Secretary Krug apparently referred to is direct participation in oil development by the Latin American governments themselves who own the subsoil mineral rights.

Latin American oil has been developed mainly by the efforts of private North American enterprise operating under concessions from the various governments. The practical question today is to what extent and how this private enterprise is going to be permitted to continue to develop Latin America's oil resources.

There is no question that profit sharing in this development is on an entirely different basis than it was in the early days and that private

Members of the International Petroleum Congress held in connection with the recent International Petroleum Exposition in Tulsa.

enterprise is in agreement with Latin American governments on this crucial question. This was particularly emphasized in the statement before the International Petroleum Congress by Dr. Jose Martorano, chief of the Venezuelan government's oil division, who related the methods whereby his government is today receiving an equal division of oil profits with the operating companies.

In the same report, however, he announced that Venezuela, the world's largest crude oil exporting country, now contemplates forming its own government-owned oil company to operate directly in exploration, production and refining and that for the time being it has no intention of granting any more concessions to private oil companies for their exclusive operation.

This was particularly interesting in view of the "feelers" for the enlistment of private capital put out by the Argentine delegation, whose government initiated this same policy of "freezing" private company development and forming a government oil company back in 1934. Statistically, Argentine production has increased since that date, but at a rate far slower than its potentialities justify. Argentina, which once could supply almost 60 percent of its own needs, today can supply only 45 percent. The recent contract to drill 40 wildcats which the government-owned YPF signed with the Drilling & Exploration Co., and the abortive, but significant, negotiations with Glenn McCarthy of Houston to work out a multi-million dollar development program, as well as some of the private statements of Argentine delegates at the Exposition, indicate that Argentina is readjusting some of its more ardent nationalistic ideas.

Mexican policy is undergoing an even more definite change. Senator Antonio Bermudez, head of the Mexican government-owned Petroleos Mexicanos, made a particularly strong speech to the Congress putting out a new welcome mat for American oil participation, but quite different from the one which was yanked out from under foreign-owned oil companies by the 1938 expropriation.

Senator Bermudez' address was impressive in its sincerity and cordiality. Although he left no doubt that a national control of Mexican oil development is a paramount principle, he stressed the possibilities of outside cooperation in the form of technical, practical and financial assistance in speeding up exploitation of Mexican oil reserves. As did Secretary Krug, he underscored the importance of western hemisphere oil development for western hemisphere security and announced that "Mexico is definitely willing to contribute part of its oil for the defense of this western hemisphere, in the unfortunate case of a war crisis, and consequently Mexico wishes to be fully prepared."

Like Argentina, Mexico's development since nationalization of its oil industry has been slow in relation to the growth of domestic demand. Once the world's second largest exporting country, next year, according to its own figures, it will become a net importing nation if it fails to discover sufficient new reserves to meet its growing demands.

Also like Argentina, Mexico is attempting to speed up development by contracts with American sources. Its recent arrangements with J. Edward Jones to drill 100 wells, although not in full operation, pending the contractor's ability to obtain steel and $20 million financing on Pemex bonds given him, nevertheless was the first opening of a previously closed door. Now Cities Service is loaning Pemex $10 million and technical services in return for call on 50 percent of the oil developed through exploration of a specific area. Other deals are being negotiated.

Brazilian delegate, General Joao Barreto, chief of its government National Petroleum Council, was silent at the Congress about his country's plans. Lack of development of Brazil's great potentialities due to its closed door policy, coupled with rising consumption needs, is pressuring less restrictive legislation in Brazil, but whether it will serve the purpose remains to be seen.

On the other hand, Dr. Carlos Alzamora, representing the Peruvian government, enthusiastically stated his country's desire for North American capital to join hands with the new Peruvian government oil company, recently formed to break the domestic political deadlock over oil development by foreign capital. Just what kind of hand-holding it will be and whether a marriage is possible depends upon a more definite statement of operating conditions.

To the situation of all these important countries—Venezuela, Argentina, Mexico, Brazil and Peru—add the deteriorating conditions in Colombia and the restrictions of Chile, and a very clear pattern emerges in spite of the apparent differences existing between their respective policies.

The nationalistic desire of Latin American countries to develop their own oil resources through government-owned operating companies has been increasing rather than decreasing in recent years. Its growth apparently is based primarily upon the hope of obtaining greater financial returns from their oil resources. Mexico and Argentina, however, are prime examples of the fact that government operating companies do not approach this goal in step with the rapid growth in demand for oil products and that Latin America needs the assistance of outside financial and technical resources.

Venezuela has demonstrated that it is possible to achieve an equitable distribution of profits between the government and foreign operating companies, and Venezuela has seen the greatest development of its oil resources of any country in the world during the past twenty years. The proposed Venezuelan government operating company and policy of issuing no more concessions is not so much an expression of nationalistic policy as it is that of a fear that Venezuela is being developed too rapidly and beyond its present capacity to handle wisely the great influx of oil income. There is a possibility, of course, that the suggested plan may operate to retard future development, but the government company has not yet been organized, and in its suggested form it is proposed to supplement rather than compete with established private undertakings. It remains to be seen whether or not it will continue to make Venezuela attractive for oil investment or whether it will prevent free enterprise development.

In a little over ten years' time, dating from the Bolivian expropriation of North American oil properties in 1937, the question of equitable development has definitely changed in Latin America. The original problem was that the countries which owned the resources were not receiving adequate compensation for their exploitation. Today the problem is that further development is blocked unless private enterprise can receive adequate compensation and freedom of operation to encourage greater investment.

Even the attempted "compromise" ventures which Mexico and Argentina are trying are hardly the kind which will achieve full development. The oil companies which can and will act simply as "bankers" are very few. The very nature of the oil business requires risk capital and competition to achieve maximum development. Furthermore, judging by past records, no government company in any country in the world can operate as efficiently, as economically, or as successfully as a private company.

Basically, Latin America and the United States are in the position of two men, each of whom has a torn half of a thousand dollar bill. Until they can agree to put it together and spend it jointly, it does neither of them any good. The United States has the capital, the know-how and the market, but not sufficient developed resources to cover all prospective needs. Latin America has great undeveloped resources and the vital need for capitalizing on them for its own internal development and international trade possibilities, but has not sufficient capital, technical resources or domestic market facilities to be able to do so.

The time has come when the representatives of government and private capital should sit down around the conference table, talk economic sense and work out fair measures for putting their torn halves of the bill together. Latin America should know by this time that American "imperialism" is a stuffed dodo, which the Russians have simply pulled off the shelf, dusted and proclaimed as the discovery of a new species. The United States, on its part, should stop dodging the issue, as witness the State Department decision before the Bogota conference began that it would not discuss oil.

At the moment the broad sunlight needed for the clear examination of the facts is obscured by the temporary clouds of materials shortages. Latin Americans are resentful of the diversion of flow of American steel, dollars and attention toward the rebuilding of Europe, while their own needs, as they see it, are relegated to the background. Mexico blames its lack of oil development on its inability to buy steel in the United States. Argentina has a similar complaint. Venezuela offers as one of the reasons for its proposed new policy the conservation of its exhaustible resources since they cannot buy what they need from the United States.

Although this materials shortage is critical, it is certainly not permanent. And if the western hemisphere, from a security viewpoint alone, is not to be caught with too little oil, too late, it is essential that the existing situation be put into its proper perspective and that the basic problem of reaching a fundamental accord on policy be tackled.

Among the Latin American countries which are exporters of crude and oil products, there is concern over the threat of competition from the Middle East. While the elaborate plans for the construction of pipelines and refineries which will place a rapidly increasing volume of Middle East oil on the eastern shore of the Mediterranean are stayed at the moment by the disturbed conditions prevailing in that part of the world, this is a temporary condition. The likelihood is that, with the combined advantage of geographical position and lower production costs, oil from the East gradually will occupy a larger proportion of the marketing area of western Europe which heretofore has obtained much of its supply from the Caribbean district.

As against this prospective development is to be set the certainty that the United States will require increasingly large quantities of petroleum from outside sources. Demand is growing rapidly in other countries of both North and South America which do not possess indigenous oil resources, and the requirements of these growing markets in all probability can absorb all the production that results from normal development of the industry in both continents.

Not merely from the viewpoint of hemispheric security, therefore, but also as a matter of mutually beneficial trade, it would seem desirable, even imperative, for the governments and the oil interests of the western continents to work together, as they are well equipped to do, through measures that complement one another.

Such discussion groups as those which assembled at the International Petroleum Congress are of value in focussing the spotlight on the question. The very fact that Latin American governments participate in them at the request of private enterprise should certainly indicate to the United States government, and particularly to the State Department, that there is no reluctance on the part of Latin America to examine the problem. And this is a matter which must be worked out largely between governments, for the United States is alone in the western hemisphere in private ownership of oil resources.

The representatives of private industry are their own best salesmen in demonstrating their ability to develop oil efficiently, economically and rapidly, but their merits depend upon the freedom of climate in which they operate. Only this freedom has enabled them to develop the industry to the heights it already has achieved.

Oil, in the final analysis, is a prisoner, not of the earth's rocks, but of the laws which men make.

Mel Coston of Humble Oil & Refining Co. snapped this unusual photograph of two waterspouts in the Gulf of Mexico near Humble's $1,200,000 Grand Isle drilling platform eight miles offshore. The drilling platform may be dimly seen near the base of one of the waterspouts. Hurricanes and waterspouts are weather hazards which producers must design against in drilling on the continental shelf.

Preventive Medicine At Talara

INTERNATIONAL Petroleum Company, Ltd., is putting into practice the new-day conviction that, rather than keep the doctor away, he should be brought into our daily lives. To accomplish this, it is building a sprawling, one-story clinic as handsome as many a United States country club at Talara, Peru. Here all of the 15,000 inhabitants of Talara will be welcome. Here preventive medicine will be put to work. With its help the company expects a healthier community, happier families, more efficient workers. International Petroleum has had long experience in the beneficence of clinical assistance. For years the company has maintained a clinic in the town hospital. The new and separate building is a postwar enlargement of those facilities. It will serve everyone in Talara — both nationals and foreigners. Its several departments: medical, surgical, obstetrical and eye, ear, nose and throat, will provide every medical assistance except hospitalization.

Inducing Talarans to use the clinic when it was first introduced was not an easy accomplishment. Due to a lack of simple health education and opportunity, many of the workmen had been ailing all their lives and had assumed that chronic sickness was a part of the pain of normal living. Coupled with that was an all-too-human reluctance to adopt new habits.

Realizing that healthy workers come from healthy families, the facilities of the clinic were made available to entire families. And since the word "family" is construed by the average South American to embrace all relatives by blood or marriage, as well as close friends and lodge brothers, this offer was, in effect, an invitation to everyone in the company-owned town.

As an incentive to workers to make use of the clinic, they are allowed to do so on company time. This was the touch that crowded the examining rooms. Leaving work to go to the clinic was no less pleasant an escape for Talarans than was sick call to G. I.'s.

A third means of wooing patients to its facilities is the rich-looking new building that combines modern lines and a cleanly efficient plan with thin, radiating wings and high ceilings to provide excellent natural aircooling. For convenience it has been placed near the very heart of town.

Talara is located about four degrees south of the equator at the tip of the South American bulge into the Pacific. The climate is extremely arid; it rains only once every seven years. Moist damp winds from the ocean, particularly at night, however, relieve the dryness of the atmosphere. Its combination of a good harbor and nearby oil wells explains Talara's location.

The simply functional building is of red brick with buff concrete trim. One story high, 168 feet wide overall, it has a center entrance shaded by a marquee-like screen of wood louvers. The high central clerestory of the 75-foot long waiting room rises behind this and above the lower mass of consulting and examining rooms. Welcoming color and touches of greenery are also provided by concrete flower boxes beside the entries. It will accommodate about 200 patients daily. Architects of the building are Crow, Lewis and Wick of New York. Construction is by the oil company itself.

Faced with the same shortages that have plagued the building industry everywhere, it was decided to obtain as much of the material locally as was practicable. Bricks for exterior walls and interior partitions were made in Talara. Aggregate for concrete came from nearby banks. Steel roof trusses consist of welded steel pipe salvaged from the oil fields. An abandoned narrow gauge railway (supplanted, quite naturally, by asphalt-surfaced roads,) yielded its rails for roof purlins.

All plumbing and electrical equipment, however, was brought in from the United States, as were such products as steel-tex lath for concrete floor and roof decks, to obviate the need for forms, nails, wood sash, doors, wood cabinet and other millwork which could not be produced locally.

The wood sash and all other items of millwork, trim, as well as doors, partitions and the batteries of counters and cabinets required by the dispensary, records-room and other facilities, were manufactured by Nuroco Woodwork of New Rochelle. After completion, cabinets and counters were knocked down and readied for shipment. All woodwork was rendered decay-and-termite-resistant by means of a recently developed Monsanto process. Man-made improvements such as this make wood nearly ideal material for tropical use: it will not rust, it resists the deterioration, and it can be easily worked with common tools.

Because of high daytime temperatures, good ventilation is a necessity. In plan, four narrow wings extend from the waiting room core. Wood and glass partitions separating the corridor and examining rooms and the narrowness of each wing—31 feet—encourage through ventilation, which is further stimulated by means of Donovan-type windows, consisting of two sash, the upper tilting in, the lower, out.

The 21-foot high walls of the large waiting room are ringed at the ceiling by crank-operated clerestory sash to exhaust heated air. In addition large doors at the ends of each wing permit an outward movement of air from the corridors.

Roof louvers exhaust heated air from the roof truss space. The exterior insulating cavity brick walls, as well as ceiling grills in each room, vent air into this roof plenum chamber, from which it is expelled to the outside by exhaust fans.

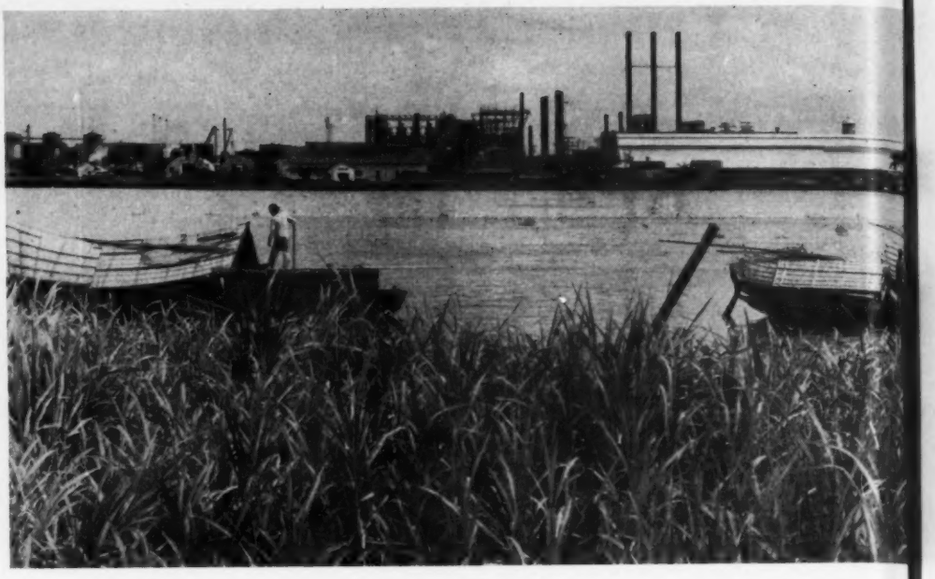
As further heat-checks the concrete roof is protected by a three-inch thick layer of vermiculite concrete. Wood-louvered hoods over sunny windows reduce solar heat penetration. Fluorescent lighting is used, because of its low heat emission. Hollophane lights in the waiting room are recessed in the ceiling and their generated heat vented into the roof space.

The building is planned to expedite the flow of work. The patient enters near a records-room desk, opening off the large waiting room. The records room, in addition to serving as a control center, also houses case histories of patients.

The patient is then directed to one of the three major wings: medical, surgical or obstetrical. A control desk at each wing directs him to one of the consulting or examining rooms lining both sides of the seven-foot wide corridor. Each consulting room, 11 feet by 11½ feet, has three nearby examining rooms, each 6½ by 11 feet. On his way out, the patient can pick up his prescription at the dispensary located in a separate wing off one end of the waiting room. Lavatories for patients and staff are located in a continuous bank just off the waiting room.

The interior finish has been kept simple and easy to maintain. Floors are of terrazzo, interior bearing partitions are of brick covered with cement plaster. Partitions between examining rooms and corridor are of wood and glass. Construction was begun in November, 1947, and completed this month.

'ROUND THE WORLD TO PALEMBANG



Soengei Gerong refinery near Palembang, Sumatra, where reconditioning of electrical equipment was undertaken after the close of the war. The plant is 40 miles up-river from the coast and is built on piles driven into marshy ground.

By Everett E. Thomas
Engineering Division,
International General Electric Co., Inc.

Everett E. Thomas

All photographs used to illustrate this article except those of Mr. Thomas and Mr. Soper were taken by Corsini for Standard-Vacuum Oil Co. in the course of a recent round-the-world flight of a group of company executives.

GLOBE girdling is fast becoming a routine matter for the men who serve the international oil industry either in a technical or operating capacity or in meeting its needs for ever-improving mechanical equipment. Extension of airline service to all quarters of the globe has made it possible to complete journeys to the most distant countries within a few weeks instead of the many months formerly required. All this has tremendously quickened the tempo of international oil operations and has vastly enlarged the scope of activity of those who have the world as their field. As an example of the change that has taken place in the brief postwar period, WORLD PETROLEUM presents the following account of a round-the-world flight made last year by a well-known engineer primarily to inspect plant installations in the Netherlands East Indies but including interesting personal experiences during a period of a little more than three months.

* * *

Palembang, Sumatra, is almost exactly half way around the world from New York City and a few degrees south of the equator. The route chosen for the outgoing trip was the Royal Dutch Airlines (KLM) service from Los Angeles, California, to Java. This seemed to offer advantages for winter flying and to avoid custom duties and immigration nuisances across Europe and Eastern countries. Preparation for such a trip requires more than six weeks to obtain necessary passport with suitable visas and medical immunization certificate according to American Transport Command (ATC) requirements, which pertain to trachoma, leprosy, dysentery, acute epilepsy, insanity, small-pox, cholera, yellow fever, tetanus, typhoid fever, paratyphoid, typhus and other assorted diseases. One's arms are sore for weeks while the injections are being taken.

KLM took the writer from Los Angeles to Honolulu, Hawaii, during the night of January 30, 1947, aboard a C-54 plane. A 24-hour layover in Honolulu gave the crew a rest and the passengers time for sightseeing trips, including Pearl Harbor naval base. We left Honolulu on the morning of February 1, cross the international date line at 3 P.M. and arrived on February 2 (same day) at Kwajalein islet of the Marshall Island group, where we remained overnight in the U. S. Army barracks—water, water everywhere. The next day we flew to Biak, New Guinea, and used abandoned U. S. Army barracks there for the night. Seven construction men remained in this hot and humid place just below the equator. They were en route to Morotai to work on an oil transfer terminal. There were four of us left, an American woman with two half-grown children, and myself, to fly to Batavia, Java, the next day (fourth of February). Five Dutch army men joined us for this flight over islands and more water. The chairs in the C-54 airplane were not over-stuffed for comfort.

Batavia looked very much as it was 25 years ago when the writer was there, but much social tension was noted and gun fire was heard just after the 9-P.M. curfew. In fact, it was not considered safe to go into the old part of Batavia during the day-time as of the first week of February, 1947. A few days were spent in Batavia to orient myself with SVPM (Standard Vacuum) headquarters people before taking a two-hour flight in a bucket seat to Palembang, Sumatra. A noonday ride on a tug boat for eight miles down the Moesi River landed me at the Soengei Gerong oil refinery of the SVPM. The Moesi River is about one mile wide in this area and is navigable by ocean-going ships to Palembang, which is located about 65 miles from the Bangka Straits, where the Moesi River empties into the open sea.

Up to that time very little physical work had been done on the rehabilitation of this 45,000-barrel oil refinery at Soengei Gerong, but much organizational work had been accomplished. The American contingent of about 45 men had about 2,000 Indonesians on the payroll and were paying them in rice and cloth and gave them book

credit until the money exchange could be formalized so that local merchants could handle the trade. There were five currencies available, with practically no fixed par value in the open market. Most of the houses were repaired and painted by the latter part of February, 1947, and grass, weeds, and rubbish removed from the refinery area. The destruction was appalling.

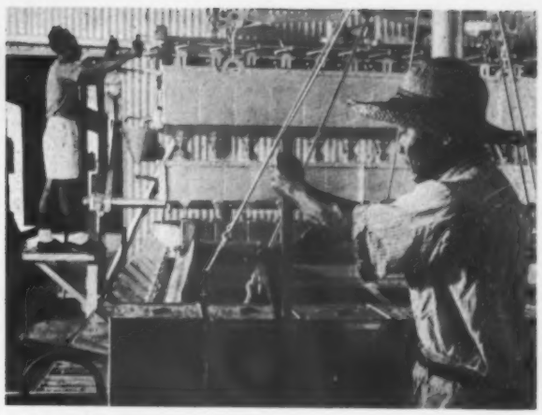
It is stated that demolition by the Netherlands Government military authorities was so effective that the Japanese were unable to run much more than 25,000 barrels of crude per day before Allied airmen completed the destruction. The writer noted that the aviation gasoline plant was destroyed beyond repair and about a square mile of the cracking coil or crude still area was damaged effectively. A book could be written to detail the damage done. The crude pump houses were practically destroyed, as well as much equipment around the cracking coils. Interconnecting piping was racked overhead and much of it became a tangled mess of broken and twisted pipe after effective bombing raids. Likewise, about one-third of the overhead electrical circuits were demolished. A few foreign staff houses were struck by bombs.

Six Americans of the SVPM staff had arrived in Soengei Gerong during July, 1946, to take title from the Japanese, who presented a detailed inventory list in English and demanded a receipt. The Japanese left the premises in good order when the British Indian soldiers moved in and defaced the staff houses which were used for billeting purposes. They pulled all mirrors off the bath room walls and broke them into several pieces so each one would have a mirror to hold between his toes so he could see how he was combing his long hair. Much of the plumbing fixtures and all door knobs were missing. The writer saw much of such loot, including wrenches, wire rope and many other articles for sale in the alleys of the city of Palembang.

Dutch soldiers fought their way in against an Indonesian army during the first week of January, 1947. They had several skirmishes before they were able to establish a safe zone twenty miles in radius about the city of Palembang. Four nights of pyrotechnics up the Moesi River in the direction of Palembang were observed by the few Americans in Soengei Gerong before the Dutch soldiers replaced the British Indian soldiers in the oil refinery area.

Robert H. Soper, a turbine supervising engineer of the General Electric Co. since 1919, was one of the Americans who observed the local conditions set forth in this article. He stated that the Dutch power plant operators put sand in the oil tanks of the two 2,000 KW and two 4,000 KW steam turbine-generator units of General Electric manufacture and left them operating under load just before the Japanese moved into the refinery area. The result was that all bearings and interstage and steam sealing packings were damaged badly. Also, one of the generator fields was burned out, but the Japanese sent it to Japan and had it repaired. They were able to repair and put into operation only one of these units before the end of the war. Mr. Soper was able to repair all of

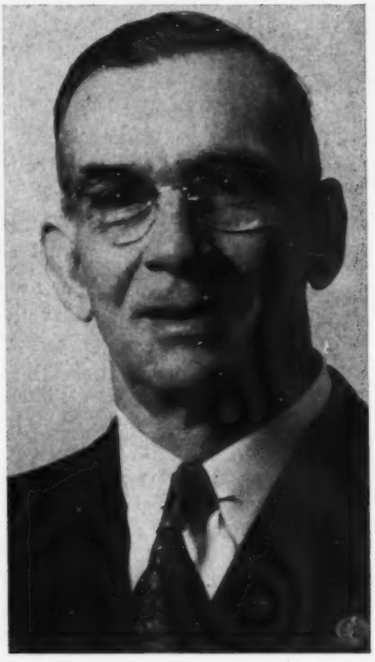
Indonesian carpenter who uses a foot as well as both hands as he works at his trade.



Filling 5-gallon tins with kerosene at the Soengei Gerong can plant. Kerosene is one of the most important products of the plant for distribution in the Orient.

Clearing away part of the wreckage left by Japanese at the end of the war. At present the refinery is operating at pre-war capacity of 45,000 barrels per day. Engineer Soper was able to restore two 2,000 KW and two 4,000 KW steam turbine generator units in less than a year with local machine shop facilities. The Japanese got only one back in operation throughout the war after Dutch military demolition.

← Housing under construction in the Pendopo field. Here as well as near the refinery there is an acute shortage of living quarters for SVPM employees.



Robert H. Soper won the Charles A. Coffin award from International General Electric for his work in rehabilitating four turbine generators destroyed by the Japanese at the Soengei Gerong refinery of Standard-Vacuum (SVPM), near Palembang, Sumatra. The Coffin award is named for the first president of General Electric and carries a cash award for outstanding work.

Wrecked well casing and junked motor equipment piled outside the village of Telok Loeboek on the road between the Soengei Gerong refinery and the Pendopo field.

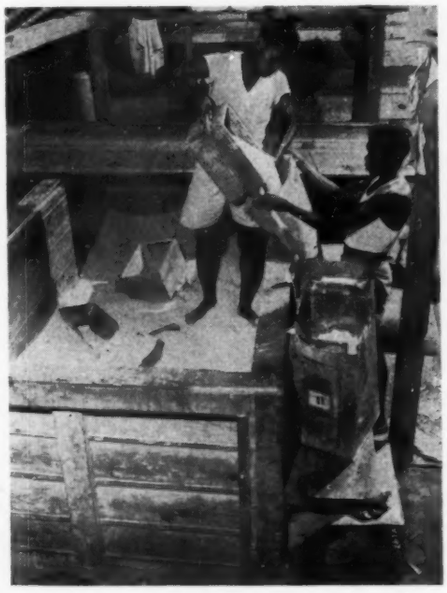
these units by use of local warehouse stores and machine-shop facilities. He had all of them in excellent operating condition by July, 1947, and was highly commended by all parties concerned.

The Soengei Gerong oil refinery was built on made ground on the lower side of the Koemering River where it empties into the Moesi River. The Pladjoe oil refinery of the Bataafsche Petroleum Maatschappij (BPM) is located across the Koemering River from Soengei Gerong, and the distance between the two refineries is about 1,500 feet. The Japanese built an army engineer type of bridge across the Koemering River to provide quick access from one refinery to the other. They also laid a power cable across this bridge to supply Pladjoe power to Soengei Gerong. The Japanese left a 2,000 KW, 50/60 cycle frequency changer set in crates on the Soengei Gerong wharf. Apparently, they intended to make a permanent power tie between Pladjoe and Soengei Gerong. Furthermore, the Japanese were building a 10,000 KW, 50 cycle steam turbine power plant about eight miles down the Moesi River from Soengei Gerong. All welded steel structure was in place and the 10,000 KW unit was in crates near by this structure, by the end of the war. Evidently, the Japanese had moved in to stay and develop this area. They had a large cache of electrical equipment near Pladjoe, consisting of many sizes of electric motors, control, cable, etc.

The Japanese had been very busy. They built reinforced concrete bomb-proof walls between the boilers and through the firing aisle which had a row of boilers on each side. This boiler house is adjacent to the main power house located near the middle of the existing oil refinery in Soengei Gerong. Similar tactics were used at the pump houses and other more vulnerable locations in Soengei Gerong and in Pladjoe.

The writer was in this area from February 8 to March 22, 1947. There was much cloudy weather, with frequent showers. The days were comfortable owing to light breezes, but the evenings were close and humid. The average rainfall is about 170 inches per year, and the shade temperature ranges from 70 to 90 degrees Fahrenheit. My notes show that the guest house walls were repaired and painted on February 25-26, and the 28th was the first clear day in ten days. The man-servant assigned to me seemed to anticipate all my needs. He saw that the house-maid did my wash every morning, and he ironed it during the afternoon. His wife did

Clay soil in the Pendopo field is very slick in wet weather making traffic difficult, even with the aid of crawler tractors.



Preparing rice rations for SVPM employees at the refinery. Workers are paid partly in foodstuffs because of unsettled currency and shortage of local food supplies.

Employee rations provided by SVPM include cocoanut oil, kerosene, rice, salt, pepper, tea, soap, cigarettes and matches, all of which are scarce and expensive in Sumatra.

some mending for me. These people do fine needlework. The rank and file do not seem to care who runs the country so long as they have plenty of rice, fish and cloth, and a roof over their heads. A new English bicycle was assigned to me on my arrival as a means of travel within the oil refinery. Most foreign staff men use them there.

It is surprising what a few weeks of good housekeeping in an oil refinery area will do to improve its appearance and boost the morale of its personnel. My over-all studies were completed in six weeks and reported by March 21, 1947, but several detail studies were left in the hands of the SVPM electrical engineer, John E. Cook, whom the writer met in Venezuela a few years ago. We boarded the S. S. Lemberg (Dutch C-3 ship) for a two-day run to Batavia, Java. This ship had just brought a full cargo of supplies, including 1,000 tons of rice from Ecuador, and 15 Dutch wives, to Soengei Gerong.

It was noted that the social tension in Batavia had subsided to a major extent, so we were able to see all of the city as of olden times. The Linggadjati treaty was signed in Batavia on March 25, 1947, by the Dutch and Indonesians. A 24-hour holiday was declared and it was noted that the Indonesian school children marched unusually well.

The Chinese are the merchants in Sumatra and Java. Other people in Batavia and Palembang are of Malay stock and seem to have no business economics in their operations. Furthermore, there are six national groups in Java who do not appreciate one another in this densely populated island. Although Sumatra is much less densely populated, it has four distinct and independent national groups. Such a diversity of people in the East Indies makes the success of the Indonesian Republic idea appear doubtful without strong outside guidance.

The writer was in Batavia, Java, from March 23 to March 27, when he departed westward by KLM flight. The first evening was spent in Singapore, where life seemed to be normal. In fact, the city did not appear to have been in the war. We arrived in Bangkok, Siam, early next morning and remained here for 24 hours between flights. A jeep ride about the city was an interesting one. We crossed the river on a bombed steel bridge which had had temporary repairs, and in driving about the old temple area saw several exquisite temples or wats. Although there is a large Chinese element in Bangkok, it was noted that the Siamese operate many of the stores. They are a proud, short, stocky, brown people, whose language is a mixture of Arabic and Balinese—perhaps the Wallace ethnic line may explain this situation. The telephone book is printed in Siamese "short hand" from right to left. Bangkok is a remarkably clean city for a tropical climate area. The Malay people are short, more slender, meeker, and have darker brown color than the Siamese.

The writer tried to sleep in a four-posted bed that was without springs but had a mosquito net. The night was too hot for much sleep and rest. We got up at 3:00 A.M. on March 29 for breakfast and a 12-mile bus ride to the airport, where we arrived at 5:00 A.M. to check through customs and immigration lines for flight at 7:00 A.M. We had lunch at Calcutta, India, where passport visas were checked. We arrived at the Karachi, India, airport at sundown, where we checked through the customs and immigration lines again and took a 13-mile bus ride to a hotel. It was 10:00 P.M. before we were through dinner, and we had to get up at 3:00 A.M., March 30, and have breakfast in time for the 4:00 A.M. chilly bus ride to the airport. That clear cool air felt good for a change from several weeks of hot humid air in the tropics. We left Karachi airport at 5:00 A.M. and had another breakfast at 8:00 A.M. while we flew up the Persian Gulf coast of Iran. We arrived in Basrah, Iraq, at noon Karachi time, but only 10:00 A.M. Basrah time, so we had another breakfast—three meals totaling six eggs in addition to other foods. We arrived at Cairo, Egypt, at 3:00 P.M. Cairo time, or 7:00 P.M. Karachi time, which makes total flying time of 14 hours with one hour out at Basrah, or 13 net hours in the air for the day. The distance from Karachi to Cairo by this route is 2,000 nautical miles.

A few days were spent in Cairo visiting oil people and seeing some of the major sights, such as the Pyramids and Sphinx, while waiting for a TWA flight to Dhahran, Saudi Arabia. The month of April, 1947, was spent in that area to become acquainted with oil operations there. A trip was made to Qatif to observe how Arabs live in a large oasis. This walled city is 2,500

years old. Its people raise dates, tend sheep, and go fishing. Their principal exports are dates and pearls. Their poorest men are as proud and haughty as the richest. They are relatively tall, slender, highly sensitive, and have handsome features, and they are friendly when met properly. Their women are fully cloaked from the eyes of the public.

An Arab interperter invited me to his home in Jubail for dinner on Friday, April 11, which is the equivalent of our Sunday in the Moslem faith. He brought his small children into the well ventilated upstairs guest room while we had ceremonial tea. This room was heavily carpeted by the use of several Persian rugs, and cushions lined the walls. We removed our shoes at the threshold and sat cross legged on the rugs. Dinner was served on a large metal platter about three feet in diameter and this platter was heaped with food and placed on a straw mat on the rugs.

Above: Interior of a SVPM refinery worker's cottage with the bicycle occupying a place of honor in the living room.

Well-seasoned rice filled the platter, with three broiled whole chickens on top. Small bits of well-cooked beef and mutton were served with their juices in a number of small platters placed around the big one. The procedure was to grab a large handful of rice in the left hand, wad it into a ball and toss it into your mouth. The tasty chicken was torn apart by the use of both hands. Unleavened whole wheat bread about the size of a dinner plate was used as a plate and we ate the plate by tearing pieces off and sopping them in the gravy. A hot moist towel was passed around for obvious use.

The next move was to call on the Emir, or mayor of the city. We climbed the outdoor stairs to his large guest room which was also heavily carpeted with Persian rugs and had large cushions all along the walls. The foreign aspect was a row of cane-bottom chairs in the middle of the room for the use of foreigners. The Emir was sitting on a cushion in the official corner of the room and had a radio tucked behind his wall cushions. He motioned to me to sit cross legged on a cushion placed on his right, and had ceremonial spiced tea served, which was followed by spiced coffee during the conversation. The incense burner was passed around for us to quaff its perfume when the interview was terminated. Pearl fishing is the principal industry at this location on the upper reach of the Persian Gulf. The houses are built of local chert mixed with slaked lime.

A few days were spent on Bahrein Island to observe oil operations there before returning to Cairo, Egypt. Much more irrigation is needed badly in the Middle East. Sands lie everywhere but springs and water wells make them fertile.

We boarded a TWA airplane in Dhahran at 7:00 P.M. on May 1, 1947, and arrived in Cairo at 3:30 A.M. of the next day. The next few days were spent in Cairo and arranging to fly home. Cairo is a city of Arabs, Egyptians, and Europeans. It is all one's life is worth to walk alone on the streets during the late afternoon as one is literally mobbed by street hawkers and bootblacks. These pests follow you block

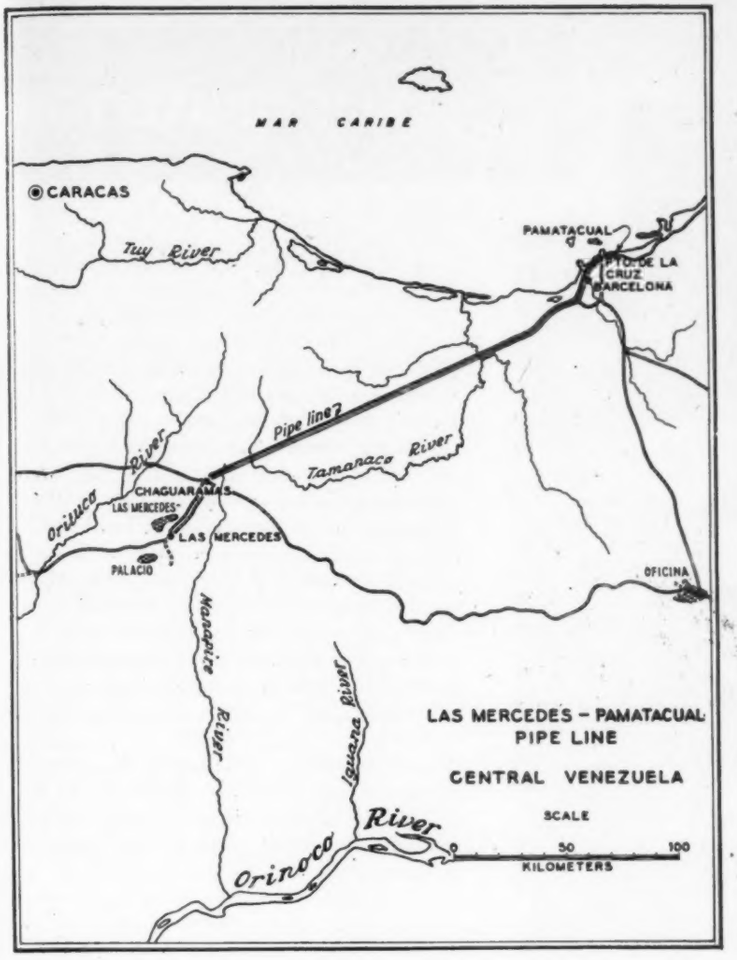
Mosquito control is an important part in the SVPM program for medical care of employees. Swampy ground around the refinery is sprayed with DDT-kerosene mixtures regularly.

after block and some of the half grown bootblack boys threaten you even though you have just had your shoes shined. Paying for services in the street is dangerous because all these nondescript people in sight flock around you and insist on tips for each and every one. It really pays to have an accredited Arab guide at all times to ward off such people.

The writer was finally able to procure passage on TWA flight direct from Cairo to New York. We left Cairo at 11:30 P.M. on May 6, after passing through the customs and immigration lines; customs in and out of Cairo can be expensive. On May 7, we arrived in Rome at 6:30 A.M.; Madrid at noon; Lisbon at 2:00 P.M.; Santa Maria Island in the Azores at 5:00 P.M.; Gander in Newfoundland at midnight; and La Guardia airport in New York City at 6:30 A.M. on May 8, 1947, with a few more hours spent aboard a train to Schenectady, New York. Stated times pertain to each location and the total flight distance from Cairo to New York became 5,418 nautical miles, or approximately 6,250 statute miles.

Below: Exterior view of company housing for refinery workers. Houses are built for easy maintenance in the tropics with high, well-ventilated roofs for coolness.

Native housing for Indonesians not employed by oil companies often is built on piles driven into swampy ground. Roofs are thatched with palm fronds and walls made of odds and ends.



Terminal of the new pipe line to be known as the Pamatacual terminal is near Guanta.

Venezuelan village of San Casimiro between Mercedes and Caracas showing typical terrain in background.

Pipe Line Aids Development of Venezuelan States

By Anne Newman Sutton

COMPLETION in June of Los Mercedes pipeline brings the Venezuelan states of Guarico and Anzoategui into position to participate in the general program of industrialization which is sweeping South America. While its primary purpose is to supply an outlet for crude oil in Los Mercedes field and vicinity, construction and operation of the pipeline will bring a degree of progress, tending to industrialize local centers of population. To another of Venezuela's hinterlands and to the coastal terminal in the vicinity of Puerto La Cruz opportunities for better living standards will be provided.

Beginning near Las Mercedes field in central Guarico, the pipeline continues in a northeasterly direction to the Pamatacual terminal just east of Guanta, state of Anzoategui, covering a distance of 157 miles. This is some 13 miles longer than Creole Petroleum Corporation's 26-inch Ule-Amuay pipeline. In sparsely populated Guarico, Las Mercedes pipeline touches Chaguaramas and is not far removed from the little towns of Valle de la Pascua and San Antonio de Tamanaco. In Anzoategui the towns that lie in its vicinity are Guaribe, San Francisco, San Miguel, Clarines, Piritu, Naricual, Barcelona, Puerto La Cruz and Guanta.

The land traversed by the pipeline is llanos country and therefore offered no major problems to construction. Pipe used is 16 inches in diameter with ¼-inch wall thickness and weighs 40.2 pounds per foot. However, at river crossings pipe with ½-inch wall is used. Rivers crossed are the Tamanaco, Unare and Neveri. From Chaguaramas the line runs parallel with the Guarico highway, an all-weather road which was the combined project in 1946 of eleven oil companies having concessions in Guarico and Anzoategui.

To expedite construction of the pipeline, Williams Brothers Company who had been given the contract, built permanent shops and warehouses at Barcelona while awaiting the arrival of pipe and materials. Real activity on the line proper did not get under way until the beginning of this year. Once the necessary materials had arrived, the race was on to lay pipe before the rains descended.

The Guasimito pump station at the line's point of origin a few miles from the Las Mercedes camp has an estimated capacity of 67,000 barrels per day, which can be increased by an additional pump station to almost double this amount.

As was the case with Creole Petroleum Corporation's line from Jusepin, this line was laid exposed on wooden skids at a height of six inches above ground.

The coastal terminal has a sea loading line in Pertagalete Bay. From four 130,000-barrel tanks on the bills back of the bay, loading will be accomplished by gravity.

The pipeline was built by Sociedad Anonima Petrolera Las Mercedes which is owned jointly and equally by The Texas Company and the Caracas Petroleum Company, S.A. who are the owners of La Mercedes oil field. This field has been under development during the past several years but lacking an outlet, has never been produced commercially. A total of 95 producing wells have been drilling to date, an undisclosed number of which are gas wells. The estimated potential of the field at present is about 16,000-18,000 barrels of oil per day.

This project gives to the Guarico region its first outlet to the coast for crude oil. It adds to the country's rapid growth in the number of workmen and technicians employed.

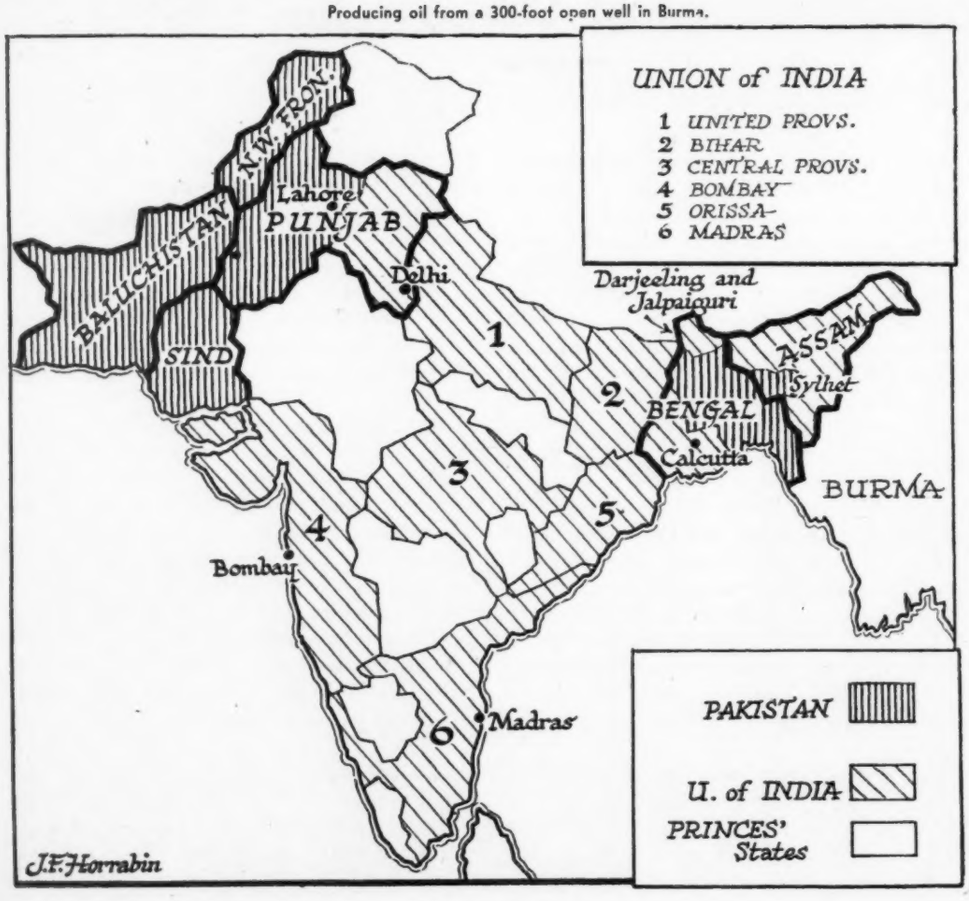
Producing oil from a 300-foot open well in Burma.

OIL'S OUTLOOK

By E. Lawson Lomax

PRIOR to the disruption of Britain's long-established relations with India and Burma by the present socialist government, this portion of the Asiatic continent was operating under laws and regulations which for the most part were common to the whole territory. Its petroleum industry, although not very large, had been developed under stable conditions with every prospect of continued progress. The inducements offered to the companies interested in exploration and development were such that they were prepared to invest large amounts of capital in the industry, with reasonable prospect of security and adequate returns on the investment.

The major portion of the capital thus invested in these enterprises was of British source, and certainly the larger portion of it had been wisely employed with regard to the general benefit and continued prosperity of the industry. The volume of production, however, never has been sufficient to meet the domestic consumption of the territory, and large quantities were imported, mainly from Persia and Netherlands East India.



Producing areas are located in Burma, Assam and Punjab, but the activities of British companies have not been confined to these territories. For over thirty years active prospecting has been carried on both in India and Burma by the various companies, of which probably the Burmah Oil Company has been the most active, and in recent years this prospecting has been intensified by the use of aerial surveys. This work was interrupted by the war but is again becoming active as materials and personnel are available. Since 1937 aerial photographic work covering 35,000 square miles of tertiary territory in Burma and some 24,000 square miles in India has been undertaken, which has necessitated the development of over 20,000 vertical photographs. Plans were in hand before the dissolution for the extension of such surveys in India. Whether these plans will now be further developed in the near future is a matter for conjecture.

The main purpose of the photographic work has been for geological mapping and photo-geological maps have been produced for large parts of the areas covered. During the campaign against the Japanese, these maps were placed at the service of the government and proved of great value to the RAF and the Army in their operations. The maps cover a wide variety of territory, from the dense tropical jungle of northern Burma, Assam and Arakan, to the scrub country of central Burma and the deserts of western India. The regions are now divided into the three territories of Burma, India and Pakistan, each with its own

IN FORMER INDIA UNCERTAIN

separate government, and the future developments are dependent on the relations which can be established betwen these various governments and the oil companies. The line they will take is largely a matter of conjecture, based on a knowledge of the characteristics of the nationals of the various territories.

It may be said that it has been the policy of the various companies over many years to raise the standard of living and education of the native population and to employ more and more of them in responsible positions connected with the industry. Thus, natives have been trained to take up positions as geologists, engineers, chemists, drillers, accountants and so forth, but the higher executive positions have mainly remained in the hands of the European staff. As the capital employed was mainly of European origin, the policy of the companies was directed from abroad. It is questionable as to what extent the native population is capable of taking control of an organization such as is necessary for the successful operation of a petroleum industry.

Burma has the longest history in petroleum of the three, and it might be expected that its nationals would be the most advanced with regard to their knowledge of the industry and most capable of taking charge. Unfortunately, however, it cannot be said that the average Burmese is addicted to hard work of any kind, and it is doubtful whether, even with their higher degree of training, they are qualified or willing to take charge of major operations.

On the other hand, the new constitution of Burma expressly pledges the country to a policy of state socialism, practically all the natural resources of the country being scheduled for nationalization. Foreigners will be allowed to participate in business undertakings only if the majority of the capital is in Burmese hands. This provision obviously will end further investment of outside capital. It is promised that contracts of existing enterprises will be honored for the present. This safeguard is not to be found in the constitution, however, but only in a letter which Shakin Nu has written to the British Prime Minister, stating that, subject to certain important provisos, no action prejudicial to foreign interests will be taken for the interim period, until a treaty of commerce is concluded. This same letter also promises "equitable compensation" if Burmese socialism dictates the expropriation of their interests.

If a liberal-minded Burmese government remains in power, it can support the continued recognition of foreign-owned enterprises by a clause in the constitution which states that nationalization must take place in the future. This phrase, "in the future," can be read as desired and gives authorities wide latitude as to its interpretation. If a Communist-minded government were to come into power, "in the future" could be translated to "immediately." There does not appear to be any immediate probability of Communists obtaining power in Burma, but they are extremely active, as witness the strikes they have engineered in recent weeks among the employees of the foreign oil companies, although these strikes soon petered out. Negotiations are pending between the foreign oil interests and the new government regarding the future of their operations, but they are at such a stage at present that any reliable forecast of their outcome is impossible. It can be stated, however, that the oil companies are working in unison in this matter and not conducting separate negotiations.

The prewar production of petroleum in Burma, just over 1,000,000 tons per year, was more than sufficient for the country's domestic consumption, and after rehabilitation which is now proceeding, should again rise to at least the same amount. Under such circumstances the natural outlets for surplus production are the neighboring countries of Pakistan and India, and, therefore, the production in Burma directly affects the position in these countries.

Belief that there is still a definite prospect of expanded production in Burma is indicated by the Burmah Oil Company in its current annual survey. Chairman Sir Kenneth B. Harper states that there is still a considerable amount of active exploration to complete, both there and in India and Pakistan. The government of Burma is in process of formulating the policy which will guide the future grant of petroleum concessions for development by private enterprise. The directors have every reason to believe that under that policy the company's existing concessions will be fully recognized. The government undertakes to pay equitable compensation if nationalization takes place. The development of all natural resources in Burma is subject to the right of nationalization.

The board is not yet satisfied that further oil deposits do not remain to be discovered in Burma, and further examination and testing of possible areas will be carried out as soon as the terms on which the company will hold prospecting licenses and mining leases have been agreed with the Union Government. The exploration program includes both India and Pakistan, where the company has been very active throughout the year and where large programs are planned, subject to agreement on reasonable terms, particularly with regard to security of tenure.

Prior to the formation of the two countries of Pakistan and India, the production of petroleum was classed under one heading as that of India. In 1938 this production totalled about 323,000 tons per year. It had fallen to 300,000 tons by 1939, but in 1941 it rose to 375,000 tons, dropping below 300,000 tons in 1942 and 1943, with a further rise to over 355,000 tons in 1944, of which Assam in India produced 304,000 tons, an Punjab, now a part of Pakistan, only 51,000 tons. Production is still falling, the figures for 1947 being, Assam 247,000 tons, Punjab 36,000 tons. There are indications, however, that production from Punjab may show a marked increase in the future from the operations of the Burmah Oil Co. and the Attock Oil Co.

As industrialization is more advanced in India than in Burma or Pakistan and it has a larger population, it will be seen that India must either seriously consider developing its pontential petroleum resources, if any, apart from

(Continued on page 72)

View of Chauk-Lanya field in upper Burma on both banks of the Irrawaddy river.

GAS TURBINES AND JET PROPULSION

By ERIC ELTHAM

The Aircraft Industry is in the Midst of a Revolution Which Involves the Basic Design of Powerplants and Hence of Fuels. Presented Here is the First of a Series of Important Articles Designed to Summarize Current Developments.

Jet propelled XB-46 developed by Consolidated Vultee for the Army is propelled by four axial flow jet engines with a static thrust of 16,000 pounds. Fuselage is 106 feet long and wingspan 113 feet. Gross weight is 91,000 pounds and useful load 42,982 pounds.

THE powerplant revolution in aircraft as a result of the development of the gas turbine, a lightweight prime mover having no reciprocating parts like the piston engine. In its simplest form it consists of three elements, an air compressor, a combustion section where the compressed air is mixed with fuel and burned, and a turbine to trap the energy of the hot gases and convert it into useful work.

This engine can be used in two ways. It can deliver mechanical energy through its rotating shaft or it can develop thrust through the principle of jet propulsion. In the latter application, the energy in the gases over and above that needed to drive the compressor (which is connected to the turbine) is turned into thrust by ejecting the hot gases through a jet nozzle. Thus, the gas turbine can drive a propeller or generate the gases to power jet planes. Military aircraft are employing both applications of the gas turbine, the turboprop being used in the experimental Ryan XF2R and the Consolidated Vultee XP-81, and the turbojet in such fighters as the Lockheed P-80, the Republic F-84 and the Boeing XB-47 bomber.

The principle of jet propulsion has been known for some 2,000 years, and an engine using it was proposed by Hero of Alexandria in 130 B.C. Nothing came of this, and until 1939 the idea remained in the minds of philosophers like Newton who explained the principle in his Third Law of Motion. True, some application was made of jet propulsion in the manufacture of rockets and pinwheels, but these were very inefficient engines hardly suitable for transportation purposes. Rockets, however, must not be ruled out as a means of propulsion, for they are being used in high-speed aircraft for special purposes. The reason jet propulsion had to wait so long to find an application was partly because it was not practical unless speeds of 350 or more miles per hour are involved, and it is not efficient below about 550 mph. Secondly, though the engine itself is a model of simplicity, the design problems involved in making an efficient engine are only just beginning to find a solution.

Jet propulsion units, whether they are the gas turbine, the ramjet or the rocket, differ from the ordinary combustion engine in the way they transform the energy of the fuel into useful work. The internal combustion engine first converts the chemical energy of the fuel into heat and then into mechanical energy; the jet turns the energy of the fuel into heat too, but this heat energy is then converted directly into propulsion energy and the intermediate step of transforming it into mechanical energy is omitted.

Aircraft, no matter what form of propulsion they employ, all utilize the principle of thrust to obtain forward momentum. Ships too use this principle which governs the forces acting on any body accelerating a mass of fluid rearward. Stated in its most concise form, it is action equals reaction. The ship's propeller accelerates water to the rear (action) and the ship moves forward (reaction); the propeller of the conventional airplane accelerates a mass of air backward (action) and the plane moves forward (reaction); the gas turbine hurls a mass of air and combustion gases out of the tail (action) and the plane moves forward (reaction). When the aircraft is in stable flight, the rearward momentum given the air by the propeller or the combustion gases is equal and opposite to the forward momentum of the aircraft.

Jet propulsion then is only a new method of obtaining thrust and not a new principle of flight. It is useful, however, to remember that the propeller develops thrust by accelerating large masses of air relatively rapidly. The net effect is the same, since propulsion thrust is the product of the mass of fluid accelerated and the velocity change. Whether the mass is large and the velocity change small or vice versa makes little difference. This is illustrated in Figure I. From this it might be assumed jet propulsion and the propeller can be used interchangeably. This is not the case, for jets do not become efficient except at high speeds and high altitudes. Under these conditions the propeller is inefficient. Hence, the one form of propulsion supplements the other, and we shall never see the jet completely displace the reciprocating engine.

There is an operating region, however, above speeds of 250 miles an hour and below 500 to 550 mph where the reciprocating engine will probably meet stiff competition from the turboprop engine. This engine is a gas turbine with a larger turbine than that in the turbojet engine. As a result more of the energy in the hot exhaust gases is converted into mechanical energy. This energy is transmitted through the shaft and reduction gears to a propeller. Since there is still some energy left in the gases leaving the turbine, these are expelled through a jet exhaust to give added thrust to the plane.

The turboprop engine weighs only about two-thirds as much as a reciprocating engine developing the same power. In addition it has a much smaller frontal area which means that air resistance or drag is decreased. Other advantages include simplicity of construction, freedom from vibration and relatively uncomplicated overhaul and maintenance procedures.

With all these merits it would seem to be a logical successor to the conventional aircraft engine. To some extent this is true, and within the next five years it undoubtedly will be used on some long-range military and commercial transports. It has one drawback, however. Under all conditions it uses considerably more fuel than the internal combustion engine.

There are also several problems to which answers must be obtained before this engine can go into service. These are concerned for the most part with the propeller and the governor, and our experience with these components of reciprocating engines does not apply to their application to the gas turbine. At least three manufacturers in the United States are experimenting with turboprops. Among these is the most powerful turboprop ever flown, the Wright XT-35, which develops a shaft horsepower of 5,500. In England, rigorous flight tests of turboprops are in progress in four-engined bombers in which two of the conventional engines have been replaced by these new powerplants. Probably the first aircraft designed specifically to operate with a turboprop is the British Aero Athena Mk I, a three-place trainer for the RAF. This plane is expected to go into service this summer. Commercial transports powered with turboprops probably will go into service about 1951.

Armstrong Siddeley Motors, Ltd., Coventry, England, recently released details regarding the construction and operation of its Mamba gas turbine propeller engine which the company says is the most powerful engine of its kind for its size in the world. The engine completed the British Air Ministry 150-hour civil and military type test on Feb. 21, 1948.

The builders state that one of their most difficult problems was to build a reduction gear from the turbine speed of some 14,000 rpm to a speed which can be usefully employed by the propeller, about 1,400 rpm, and to do this without increasing the small frontal area of the

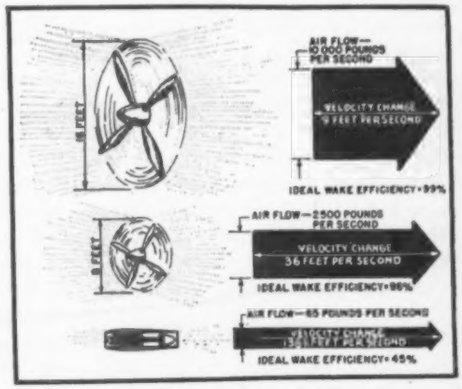
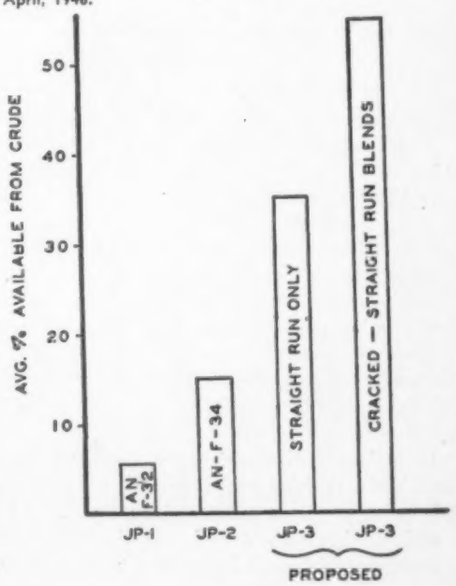
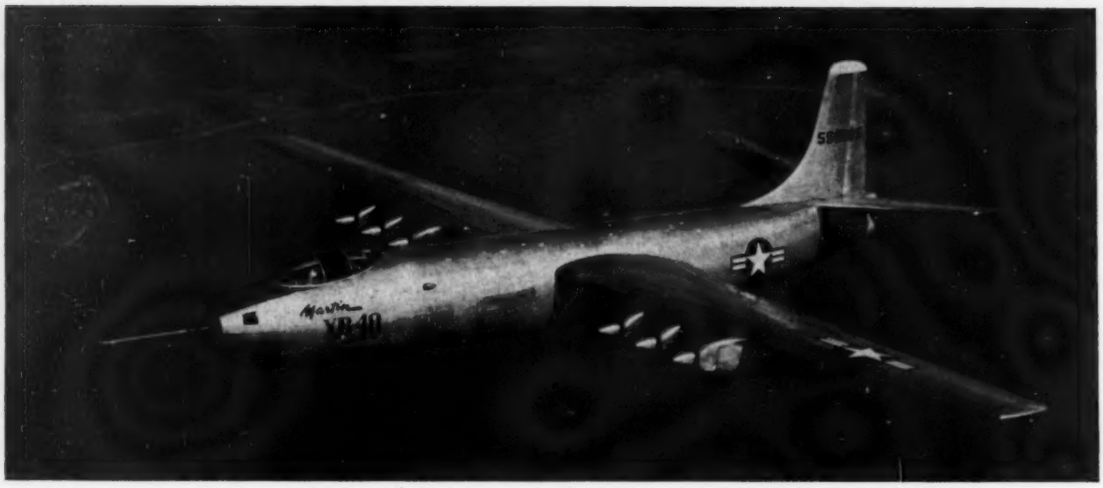

16 FEET
AIR FLOW—10,000 POUNDS PER SECOND
VELOCITY CHANGE 9 FEET PER SECOND
IDEAL WAKE EFFICIENCY=99%
8 FEET
AIR FLOW—2500 POUNDS PER SECOND
VELOCITY CHANGE 36 FEET PER SECOND
IDEAL WAKE EFFICIENCY=96%
AIR FLOW—65 POUNDS PER SECOND
IDEAL WAKE EFFICIENCY=45%

Fig. 1—Propulsive thrust is the product of mass accelerated and the velocity change. The 16-foot and 8-foot propellers, and the small turbo-jet here shown all provide the same thrust, but by widely different masses and velocity changes. Courtesy "Westinghouse Engineer" July 1947.

Fig. 2 (Below) Availability of various types of aircraft gas turbine fuels. Courtesy "Lubrication" The Texas Co., April, 1948.





Martin XB-48 Army bomber is powered by six General Electric gas turbine engines and has a speed of more then 480 miles per hour with a bomb load of more than ten tons.

engine. Other problems met by the builders involved the interaction of engine and constant speed propeller. In the Mamba the engine and propeller controls are linked by a single pilot's throttle lever. A separate constant speed control lever is not required. This arrangement has been found to provide very satisfactory handling characteristics in flight as can be judged from the fact that, if necessary, under baulked landing conditions, the power can be increased from zero to maximum in under two seconds.

For starting purposes the propeller is placed in zero pitch so that a minimum of power will be absorbed. When the engine has started, it will slow run at 8,000 rpm and can be taken up on the throttle to cruise at 14,000 rpm and then to full bore at 15,000 rpm.

The Mamba engine consists of an axial flow compressor which handles a maximum of 20 tons of air per hour from a forward facing air intake and supplies it at a pressure of 60 psi to six combustion chambers which are radially disposed round the axis of the rear main shaft. These combustion chambers, designed by Armstrong Siddeley Motors, are of special interest in that they vaporize the fuel before burning instead of the more usual system of atomizing the fuel in high pressure spray jets.

In a recent book on jet propulsion for commercial aircraft, Robert Hage of the Boeing Airplane Company predicts that a medium-range turbojet transport carrying 25 to 30 passengers and cruising at 500 to 525 mph is an extremely likely development for use on the major airlines by the end of 1950. No less an authority than Donald Douglas has voiced the opinion that commercial jet transport may be closer to realization than he once expected, which was seven to ten years from now. British experts seem to feel jets will come into commercial use between 1950 and 1955.

In evaluating these opinions, it is well to consider the experience of manufacturers who are bringing out new, postwar aircraft powered by reciprocating engines. The Douglas DC-6, for example, which went into service in May, 1947, was first proposed in 1940. The Boeing Stratocruiser, orders for which were placed in 1945, is not expected to enter service until the end of this year. In most respects there is nothing revolutionary about these aircraft, yet innumerable technical difficulties have delayed their delivery.

Designers of aircraft for operation at the speeds and altitudes at which jets are efficient will be faced with a host of new problems that cannot be solved overnight. High-speed flight may require swept-back wings or tailless aircraft. Meteorological conditions at 35,000 to 40,000 feet are still not fully known, but there are reasons to believe wind gusts exist that may subject the aircraft to forces many times greater than that of gravity. Obviously, aircraft will have to be designed to withstand these forces, and at the same time special precautions will have to be taken to ensure passenger comfort. Then there is the question of providing adequate air conditioning, which of course involves pressurization of the cabin at these altitudes. Last, but by no means least, is the matter of traffic control. Jet planes cannot circle airports waiting for an opportunity to land, so the practice of stacking will have to be eliminated. Nor can these planes economically carry fuel reserves to guarantee landing at alternate airports when the port of destination is closed in by weather. Blind landing systems will have to be installed at all airports used by these planes, and the system used will have to be 100 percent reliable. All these questions are receiving intensive study, and the pioneering work being done by the Air Force, the National Advisory Committee for Aeronautics, the Civil Aeronautics Administration and private industry will accelerate their solution. But we must fully comprehend the magnitude of the problems involved if we are to plan intelligently for the future.

Because the gas turbine is not subject to detonation troubles, it has gained the reputation of being extremely uncritical in its fuel requirements. It is true that it is more catholic in its tastes, but as more experience is gained with aircraft using these engines, the more certain specifications are found to be necessary. This is unfortunate since it restricts availability. Generally speaking, turbines have been designed to burn kerosene type fuels, and with kerosene very high combustion efficiencies are obtained. But the availability of kerosene is hardly adequate to meet the needs of a fleet of jet aircraft. For example, a jet plane uses fuel approximately five times as rapidly as a conventional airplane. If the 1947 consumption of aviation fuel in the United States had suddenly been increased five times, it would have amounted to over 200 million barrels or more than twice the total kerosene production in that year.

Those properties that determine the selection of a turbine fuel are volatility, vapor pressure, BTU content and freezing point. Volatility influences ease of starting, combustion efficiency and engine deposits. For example, in starting these engines, rich mixtures are employed. If the fuel does not ignite almost immediately, the engine becomes flooded and when ignition does occur, overheating takes place with the result that the engine parts are damaged. The current grade of jet fuel now used by the military is designated as JP-1 and meets specifications AN-F-32. The boiling range is from 325°F to 572°F and the freezing point —76°F.

Since the turbo engine uses such large quantities of fuel, it is obviously desirable to use fuels of as high a heating value as possible. Turbine aircraft has less space for fuel storage than conventional aircraft, which means the fuel should have a high BTU content per gallon instead of per pound. Aviation gasoline contains 114,000 BTU's per gallon while kerosene type fuels contain about 130,000. The higher the boiling point of a fuel, the greater is the heating value per gallon. This would indicate the advisability of developing engines that would utilize the heavier distillates. To some extent this possibility is limited by the low temperature characteristics of the fuel, for the fuel has to flow freely at the below zero temperature encountered at the higher altitudes. From a military point of view, the handling of various grades of fuel presents difficulties, and the trend may be toward using aviation gasoline in spite of its lower heat content.

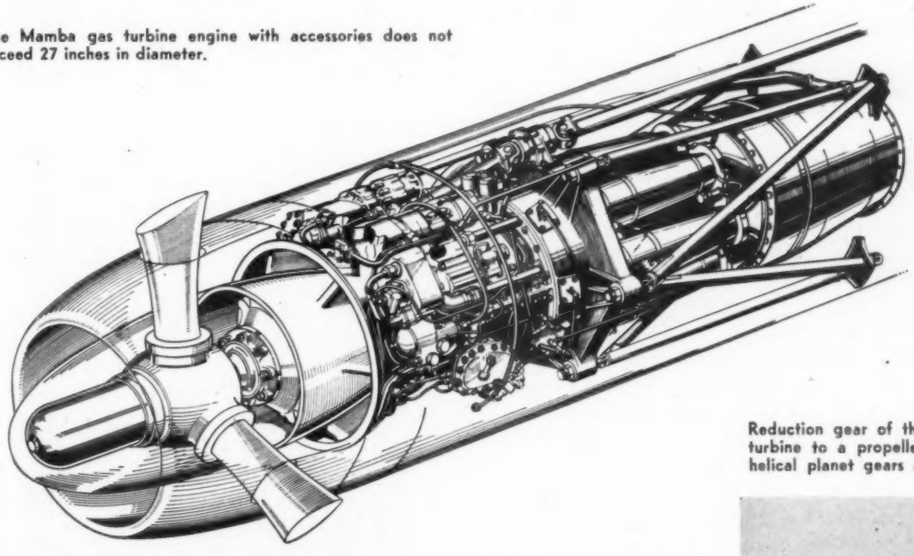
British Armstrong Siddeley plane at the time of a recent test flight. The Mamba gas turbine engine with a weight of only 1,000 pounds develops 1,000 horsepower.

At the same time, specifications AN-F-58 have been released for a new grade of jet fuel, JP-3 which is ultimately expected to replace JP-1. It has a boiling range of from 100 to 600°F and has been chosen to make the maximum quantity of fuel available. For some time the Air Force employed grade JP-2 (AN-F-32) for ground testing, but this grade has now been abandoned. Since availability is the most important factor now entering into the consideration of jet fuel types, it is interesting to compare the availability of the various types as shown in Figure 2.

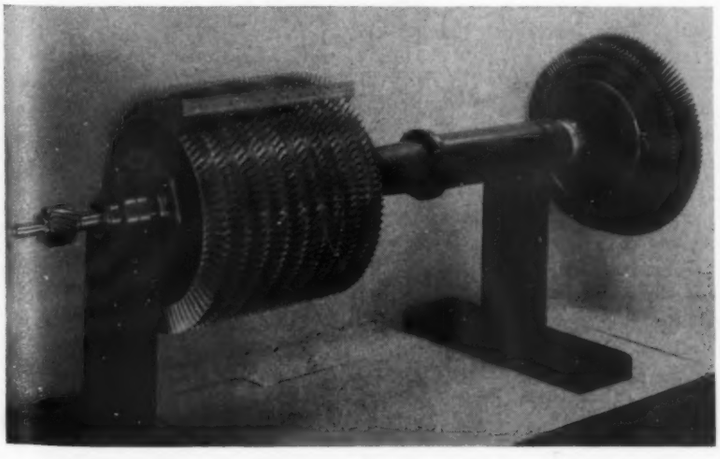
Compared with the reciprocating engine, the lubrication problems of the gas turbine are comparatively few. This is particularly true of turbojets which have no complicated gears to lubricate. Turboprops, on the other hand, have reduction gears to slow the speed of the propeller, and here tooth loadings may be as high as 30,000 to 40,000 psi. For this reason the demands on the film strength of the lubricant are high. Current specification for turboprop lubricants is AN-0-9, grade 1065, a straight mineral oil of high viscosity index. This oil is satisfactory under operating conditions, but its low temperature characteristics leave much to be desired.

Turbojets have four main bearings which are usually lubricated by a solid stream of oil under pressure. The main function of the lubricant, in addition to lubricating these bearings, is to cool, and in some engines an oil mist is used. Starting requirements call for as light an oil as possible, and a straight mineral oil of 59.4 SUS at 100°F is used. It meets specification AN-0-9 grade 1010.

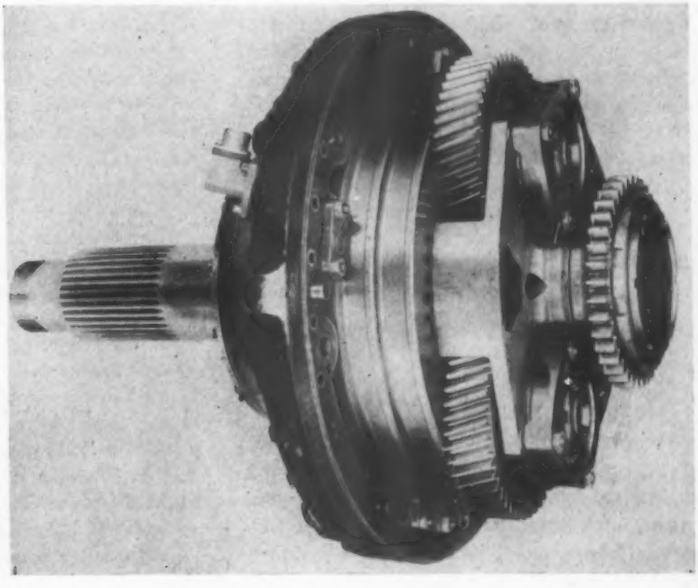
The Mamba gas turbine engine with accessories does not exceed 27 inches in diameter.

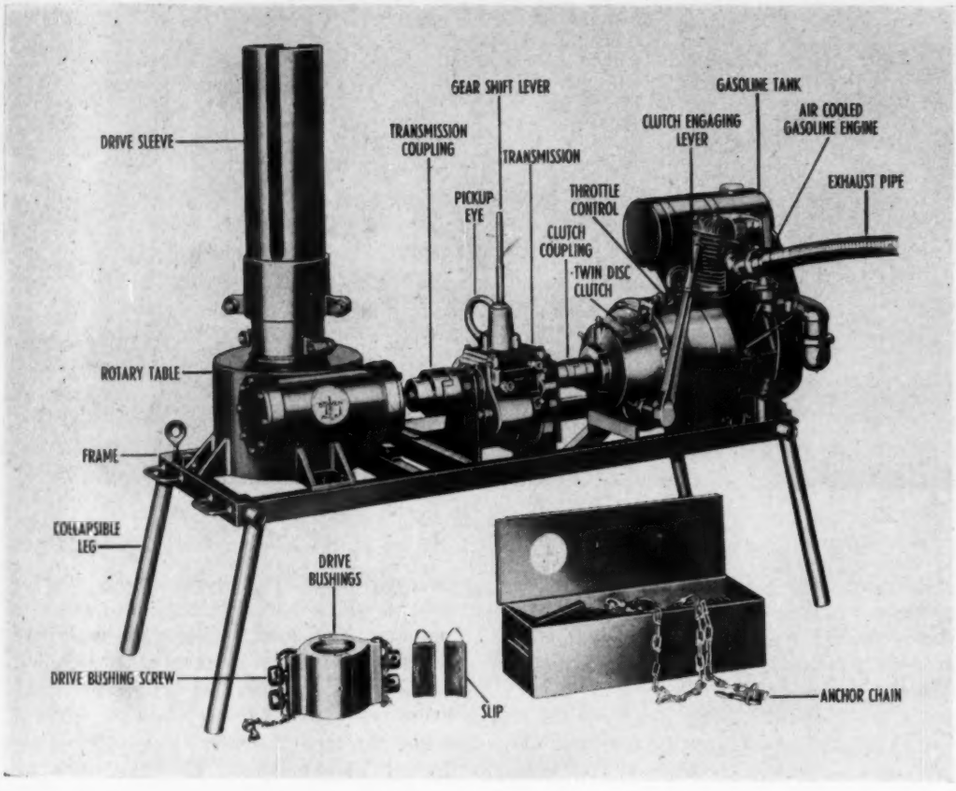


Ten stage axial flow compressor and two-stage turbine assembly of the Mamba. A 12-inch rule is laid on the compressor to show its small size.



Reduction gear of the Mamba which reduces the 15,000 rpm of the compressor and turbine to a propeller speed of 1,450 rpm. The annulus gear and two of the three helical planet gears are visible. Gear at rear of the planet carrier drives auxiliaries.





PORTABLE ROTARY TABLE

LIGHT, short-time rotary operations in the field are handled quickly by a portable powered rotary table recently developed by the S. R. Bowen Co. and tested on a series of wells in California. In one frame-mounted unit the portable rotary table provides a rotary drive for such operations as the internal cutting or milling of casing, drill pipe and tubing, drilling out cement or other obstructions in casing or tubing, backing off sucker rods and tubing, etc.

Prime mover is an air-cooled gasoline engine mounted in line and connected to a heavy-duty Twin Disc clutch. The clutch is coupled to a heavy-duty transmission providing three geared speeds forward and one geared speed in reverse. The transmission is coupled to a worm-driven rotary table having a slotted drive sleeve. The entire unit is mounted on a rugged frame to facilitate moving from rig to rig on the bed of a pick-up or light truck.

Type of operation handled by the unit is typified by the following jobs recently completed in California: Milled out bad places in 2-⅞-inch tubing and cleaned out 20 feet of cement and sand; drilled out three feet of cement with 2-⅞-inch tubing and fishtail bit at 1800 feet; lefthanding 2-⅞-inch tubing out of 6-⅝-inch casing; milling seats out of 6⅝-inch securaloy packers and taper milling 2-½-inch tubing, completing each operation in 15 to 25 minutes; cutting 4-¾-inch, 6-⅝-inch and 8-⅝-inch casing with 2-⅞-inch tubing, cuts being made at depths as great as 6,000 feet; cutting 4-½-inch drill pipe with 1-¼-inch at 5,000 feet. In each of these operations the rigging up time was only about an hour.

After the drilling or cutting string has been run in to the working depths, the complete Bowen portable self-powered rotary table is hoisted by its pick-up eye to a height sufficient to slide the slotted drive sleeve over the top joint of the working string. Once the pipe is centered in the drive sleeve, the entire unit is lowered to the floor and anchored by chaining opposite corners of the frame to opposing derrick legs. After anchoring the unit, slips of the proper size are installed in the two halves of dovetailed type drive bushings, and the two halves made up on the string by tightening the drive bushing screws. Slips are available to fit from 3-½-inch OD pipe to the smallest sucker rods. The working string is then lowered until the ears of the drive bushings are located within the slots of the drive sleeve.

With the ears of the drive bushings held in the drive sleeve slots, the string can be rotated and lowered under torque the length of the slot in the drive sleeve. Continuous operation is possible by loosening the drive bushing screws and again locating the drive bushings at the top of the drive sleeve. The string may be rotated and elevated under torque by locating the drive bushings at the bottom of the drive sleeve slot.

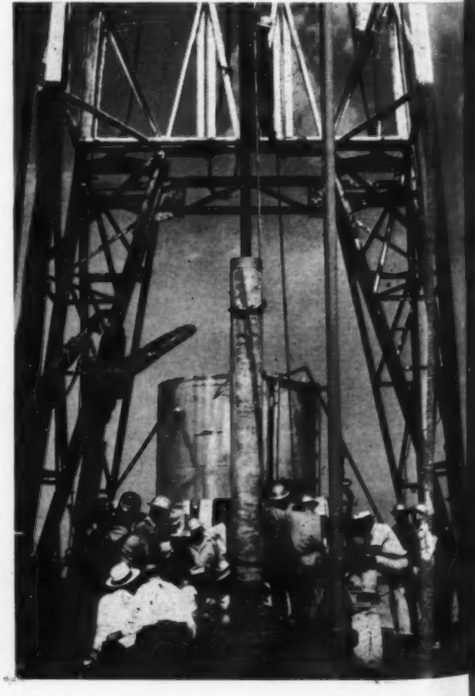
Concrete Surface Pipe Tested

Concrete surface pipe was run in a well on the John Michel farm near Marshall, Oklahoma, on June 12, as the first field test of this method of saving steel in oil drilling. The test was attended by more than 500 persons including representatives of foreign as well as domestic companies. Interest was stimulated by an exhibit of the new surface pipe at the recent International Petroleum Exposition at Tulsa.

The new pipe was develop by Knox Industries, Inc., of Enid and will be manufactured by firms in Caracas, Venezuela; Lon Beach, Calif.; and Dallas and Wichita Falls, Texas, if demand develops as is hoped by Charles E. Knox, Jr., president of Knox Industries. In its facor is the fact that surface pipe is not salvable in any drilling operation, so any steel cemented in as surface casing is there to stay. The concrete pipe contains only enough steel for proper reinforcement, connections and a 20-foot length of steel pipe at the surface for welding in of flow lines or other necessary connections.

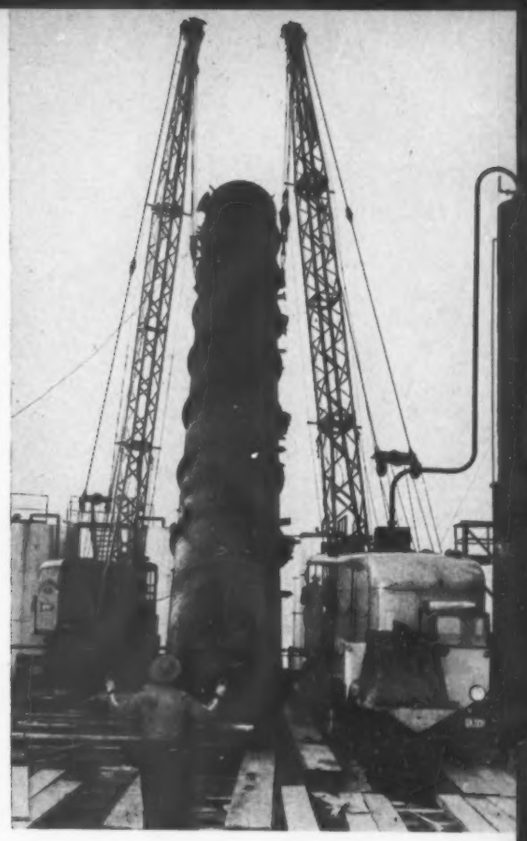
Pipe run at the Marshall test was 10-inch ID and 14-inch OD. The pipe was centrifugally cast of special concrete with reinforcing consisting of steel rods running vertically from collar to collar, to which diagonally circumferential reinforcing material was welded at four-inch intervals. Male and female compression-type collars were fitted with neoprene gaskets.

Steel casing is run on tension, but, because concrete has good compression strength, the Knox pipe must be run under compression. To do this a shoe is placed on the drill pipe, and the concrete pipe is set on this so that the dill pipe carries the weight of the string until the pipe is bottomed. In the Marshall well 228 feet of pipe was run before cementing started. Halliburton Oil Well Cementing Co. pumped in 150 sacks of cement through the shoe.



ASPHALT PLANT AT STANOVAN

By DON TYRELL



Lorrain Cranes raising 48-ton fractionating tower.

KEEPING pace with the rapidly expanding market demand in Western Canada, Standard Oil of British Columbia, Ltd., has completed a $500,000 addition to its refinery at Stanovan on the south shore of Burrard Inlet near Vancouver. This latest addition to the Standard facilities is an asphalt plant capable of producing 220 tons of finished product daily.

The new plant provides for the manufacture, blending and shipping of asphalts. The distillation unit is operated under vacuum to make asphalt of various penetrations needed for all grades of cut back asphalt. Beside increasing the asphalt output, the new addition will permit an increase in the daily crude capacity to 8,000 barrels from the former capacity of approximately 5,000 barrels.

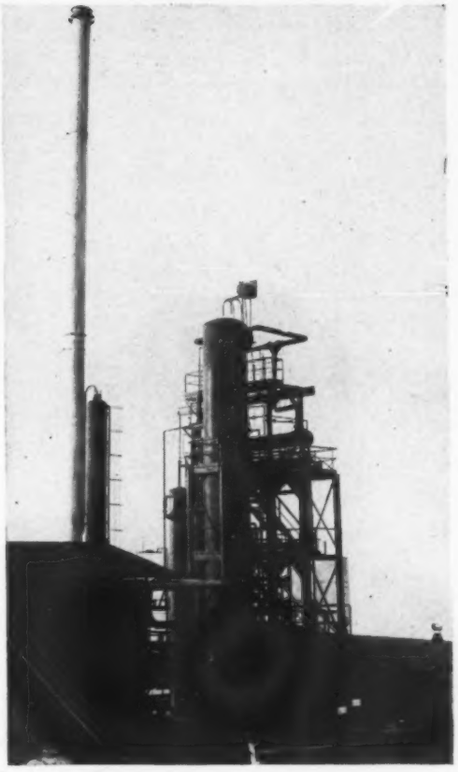
Asphalt paving products will be manufactured at first, but later the company may produce oxidized asphalt for roofing. While manufacture of the asphalts will lower the percentage of fuel oil available for sale, Ralph D. Baker, president of Standard Oil of British Columbia, Ltd., says that because of the increased refinery capacity, total production will not be reduced.

Ralph N. Parsons, of Los Angeles, designed the process portion of the plant, while Standard has acted as its own general contractor. In the purchase of supplies and equipment, preference was given to local firms wherever possible.

New processing facilities include a 48-foot fractionating column, six feet in diameter and weighing 28 tons, a 13,000,000 BTU per hour Petro Chem furnace, condensers, exchangers and cooling tower. These facilities will be operated in series with the existing equipment to make a two-stage unit. More tanks and lines have been added to store and mix cutbacks.

Parsons was responsible for the building of the processing equipment, while Standard staff engineers handled the rest of the design and construction.

One of the first major steps in the construction was the erection of the fractionating column. Fabricated in the Vancouver yards of Western Bridge Company, the heavy piece was trucked six miles through the city to the refinery site by Arrow Transfer heavy duty equipment. At the plant the column was raised into place by two 20-ton mobile Lorrain cranes. Bob Bouchard, who supervised the operation for the transfer company, claims it was the first time in Canada that cranes were used for such a job. Two days were required for the erection from the time the preliminary work was done until the column was in place. Other work of this type which was done by the use of gin poles instead of cranes took two weeks. This was the third Vancouver-area refinery job for Bouchard and his crew who had previously worked on the Shellburn plant addition in Burnaby and the first Standard addition.



Stanovan Plant of Standard Oil of British Columbia.

Leek and Company, of Vancouver, supplied the 250 HP water tube boiler. Crane and Company, Vancouver office, supplied valves, fittings and prefabricated pipes. Cooling tower for the new plant was supplied by the local representative of Foster Wheeler. Western Bridge, in addition to supplying the fractionating column fabricated the shell for the furnace, tanks, mixing kettles and structural steelwork.

Addition of the asphalt plant to the 40-acre Stanovan refinery site is another step in the steady progress made by Standard since it first came to British Columbia in 1935 when its first refining unit was built. At that time the plant consisted of an atmospheric distillation unit and thirteen tanks. The company's pumps in its first year could handle 2,000 barrels per day. The present plant handles 8,000 barrels per day and an additional 25 tanks have been built since 1935. During the war years the company installed facilities for producing both 90 and 100 octane aviation gasolines, at times manufacturing 400 barrels daily.

Crude for Stanovan, like that of other British Columbian refineries, comes from California, being shipped in tankers of the Standard Oil Company of California, of which the Vancouver company is subsidiary. Two tankers are used, the "Standard Service" of 2,000 tons displacement and the "B. C. Standard" of 250 tons displacement. The smaller ship supplies the 45 Standard marine stations along the coast of British Columbia.

In 1945 a warehouse was built alongside the company's rail siding to handle the rebuilding, repainting and cleaning of hard-to-get gasoline barrels. Four hundred barrels are handled every day in this department. Docking facilities were also increased during the war years to take care of the increasing supplies of tanker-borne crudes from California.

Before the war, as Standard's business in Canada grew, the firm expanded its facilities at Stanovan to include an emulsified asphalt plant.

Standard products in British Columbia are marketed through 300 retail outlets, 45 marine stations and three large marine barges.

Dr. James Edward Hawkins, director of research for Seismograph Service Corp. since 1941, is a native of Canada and a graduate of the University of Alberta. He was an instructor in Geophysics at Colorado School of Mines in 1940-1941 after being granted the degree of Doctor of Geophysical Engineering in 1940.

NEW SYSTEM AIDS MARINE SURVEYS

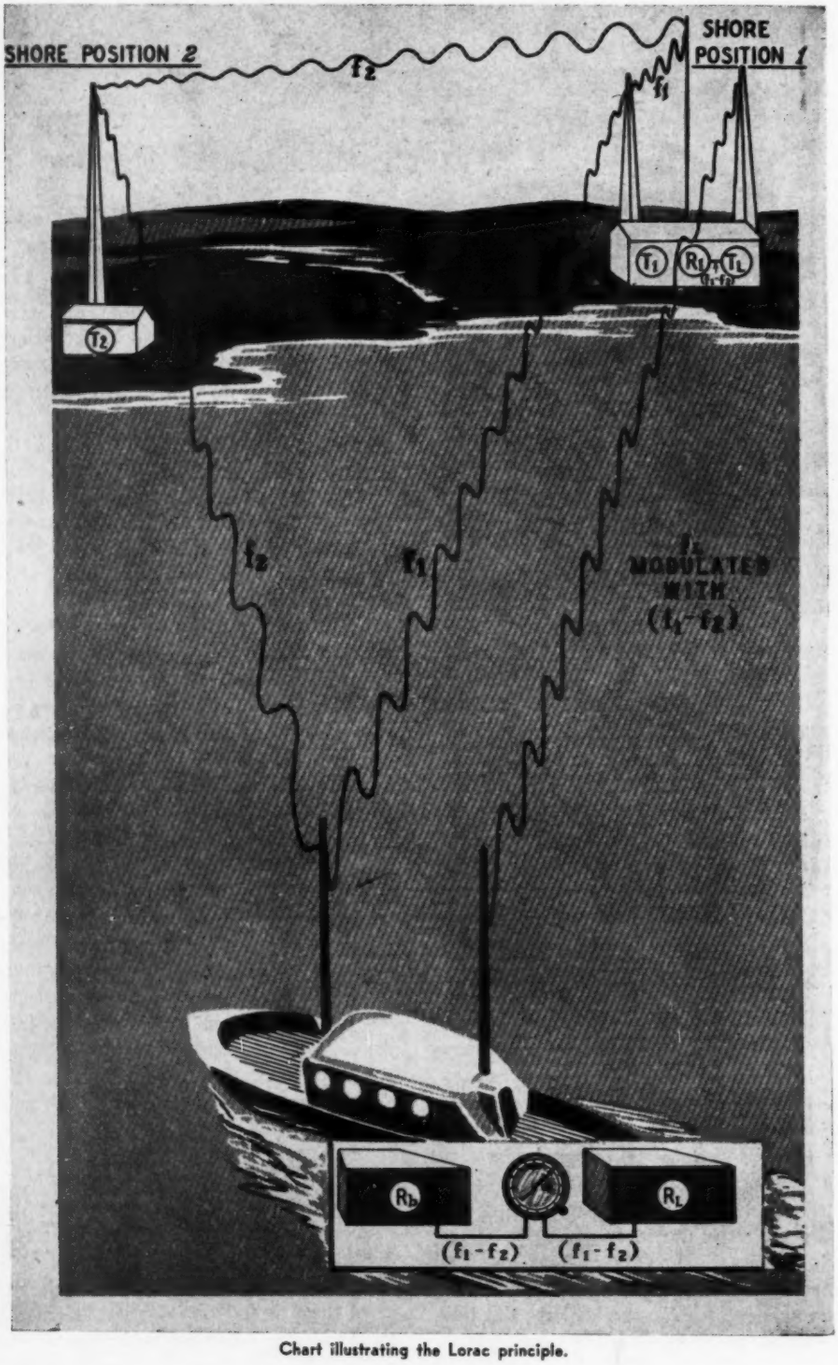


Chart illustrating the Lorac principle.

IN view of the growing interest in marine exploration, special attention is being directed to improvement of scientific apparatus employed in the survey of such areas. One such forward step in equipment is provided by the development of Lorac, a radio system devised by Dr. J. E. Hawkins and his associates of the Seismograph Service Corporation to make possible an accurate determination of position at long range. Hence the name Lorac—long range accuracy.

Various devices developed for military use in World War II, such as Radar and Shoran, have been employed in marine surveys since that time but have proved unsatisfactory because of their limitation to "line of sight" which restricted their accuracy to a distance of about 10 miles from shore. Lorac greatly extends the range of operations and is expected to permit the making of reliable geophysical surveys up to distances of 100 miles. Though designed primarily for use in marine work, its originators believe that it is applicable as well to land surveys.

Operation of Lorac may be understood by considering the location of two shore stations and one mobile marine station. These are two slave stations designated as "red" and "green" and one master station. The three transmitter stations broadcast continuously during operations, establishing a grid pattern by two sets of lines which intersect each other. A fourth unit contains receivers for both systems equipped with dials called the red and green phase meters. These meters constantly record in numbers and fractions the position of the receiving unit with regard to the grid lines formed by both patterns.

The basic principle is illustrated by considering installations at two separated fixed shore positions and one mobile ship installation as shown in the accompanying sketch. At shore position 2, a continuous-wave transmitter T2 emits a signal at frequency f2. This signal is received at shore position I by receiver R1 and at the ship by receiver Rb. At the same time a continuous-wave transmitter T1 at shore position 1 emits a signal at frequency f1, which differs from frequency f2 by an audio frequency. This signal

from transmitter T1 is received by receiver R1 at the same position and by receiver Rb on the ship. The two signals received at receiver R1 heterodyne to produce an audio beat frequency (f1-f2) which is used to modulate a reference transmitter TL located at shore position I. Transmitter TL„ operating at a frequency fL and modulated by (f1-f2), is used as a means of transferring the beat note of receiver R1 from the shore position I to the ship. On the ship receiver RL is used to de demodulate the signal and obtain the beat frequency. Meanwhile, receiver Rb on the ship has been receiving the signals from transmitter T1 and T2 and has been heterodyning them to produce the beat frequency (f1-f2).

Each of the two beat frequencies arrives at the ship with a phase value governed by the difference in the distances the original carriers have traveled before reaching the heterodyning receivers to form the beat notes. At the receiver R1, the waves from transmitter T1 and T2 heterodyne and the resultant beat note (f1-f2) has a phase value dependent on the relative distances the carriers have traveled before heterodyning. Since the positions of the antennas of T1, T2 and R1 are not changed, the phase of the beat note does not change. The beat note is transferred to the ship, still with a constant phase value, by means of the reference transmitter TL. Because of this constant phase value, it is called the "reference beat note." At the receiver Rb on board ship, the beat note (f1-f2) received directly from the transmitters T1 and T2 also has a phase value which is dependent on the relative distances between each of the shore transmitting antennas and the ship receiving antenna.

If the ship is stationary, the (f1-f2) beat note at the beat receiver Rb will maintain a constant phase value. A phase meter, connected to measure the phase relationship of the two beat notes, will show a reading, but the reading will not change as long as the boat is motionless. If slight electrical changes take place at either shore transmitter, resulting in slight variations in phase, both beat notes will vary an equal amount so that the effects will be cancelled and the phase meter reading will not change. This is an important feature of the system since it completely obviates phase synchronization problems.

Radiations from the transmitters form two interference patterns which are used as a coordinate system. A radio receiver transforms the patterns into two dial readings which in turn give a direct determination of the position of the receiver on the coordinate system. Position is determined by reading the two dials and finding the intersection of two corresponding lines on a chart which has been prepared especially for this purpose.

In operations over a large area the base line between the transmitters would be increased, thereby increasing the number of lanes and thus maintaining the potential accuracy.

Through use of the system a seismograph crew on a boat offshore could check its position with respect to both the red and green patterns, shut down operations and return to shore for the night. On the following morning it could locate the exact spot where operations were discontinued by manipulating the boat until the red and green meters indicated the position held the day before.

The distance between two lines or "lanes" on the radio grid system is broken into one hundred parts on the phase meter. When the receiving unit passes over these lanes, the meter needle makes a complete rvolution. At that tim an integrating counter mechanism adds or subtracts a digit to identify the new lane the ship has entered, and the needle continues to indicate the precise position within the new lane.

Frequencies used in continuous wave systems have a direct bearing on the potential accuracy and long range. Lorac operates on medium frequencies which emit waves that follow the curvature of the earth's surface and require no special height in receiving antennas.

An outstanding feature of the system is the simplicity with which receiving equipment may be operated. After the simple initial setting of the phase meters, position information is constantly available by reading coordinate figures from the dial indicators.

Power plant for central station in trailer.

Central station in trailer and recording truck.

International News and Notes

C. R. Vegh Garzon

C. R. VEGH GARZON of Montevideo, Uruguay, has been appointed consultant in Latin America for Universal Oil Products Co., Chicago. Mr. Vegh Garzon, who founded the South American Petroleum Institute, has served since 1940 as president of the Uruguayan section and chairman of the International Council. He has represented Uruguay at numerous international scientific congresses.

Mr. Vegh Garzon was chief engineer and later general manager of A.N.C.A.P. during the period when the petroleum refinery was erected which supplies the liquid fuel requirements of Uruguay. In this association he directed the purchase of all equipment and supplies from Great Britain and the United States. He acts as technical petroleum advisor to A.N.C.A.P. and is a director of various industrial companies. In 1946 he became technical and commercial adviser to the Refinaria de Petroleos do Distrito Federal S.A. for the construction of a petroleum refinery in Rio de Janeiro.

Exploration In Eastern Canada

Shell Exploration New Brunswick, Ltd., subsidiary of Shell Oil Company of Canada, Ltd., has completed plans to drill its first test well east of Sussex, province of New Brunswick. This will be followed by other exploratory test wells in eastern Canada later in the year.

The first well is intended to test the Albert formation which may involve drilling to a depth of 4,000 to 5,000 feet. One of the latest types of mobile rotary drilling outfits, now being shipped from Texas, will be used on the well. The major components are all mounted on one large six-wheel drive truck including two 125 HP Cummins diesel engines which form the main power unit. Drillers from the United States will be on hand for the first few weeks to train Canadian crews in the operation of the equipment.

Living quarters and mess for the drilling and seismic crews are being provided in the Army camp at Sussex. Offices and warehouses are also established there. The staff will be in the neighborhood of fifty men including drilling and seismic crews, geological parties, office staff and engineers.

Drilling operations will be in charge of A. D. Kingsford, general manager of Shell Exploration New Brunswick Ltd. Geological work will be continued with three field parties as well as supervisory geologists under the direction of Dr. W. C. Gussow, the company's chief geologist for Eastern Canada. Heiland Exploration Company will do the seismic work and key personnel and equipment for this purpose are being despatched from Denver, Colorado, and Edmonton, Alberta.

Other drilling operations have been started near Moncton, New Brunswick, by New Brunswick Oilfields, Ltd. This company is the successor to New Brunswick Gas and Oil Fields, Ltd. Reginald E. Elwell, of Boston, president of the firm, heads a combination of Canadian and American interests which took over the business of the Scotch group that formerly operated in the area. The new owners have developed a program for modernizing the equipment and procedure used in the Stony Creek field near Moncton and have conducted extensive geological surveys. The management of the field has been under the direction of E. Holley Poe & Associates, New York consultants.

The first drilling has been started by the company at Round Hill which is five miles from the nearest limit of the Stony Creek field. The site was selected from the study and recommendations by Russell S. Tarr, Tulsa geologist. This area is the easternmost gas-and-oil-producing area of continental North America.

W. E. Wallis

W. E. WALLIS is now assistant manager in the geological department of Creole Petroleum Corporation with headquarters in Caracas. Mr. Wallis was born in Highmore, South Dakota. He studied at the Colorado School of Mines, obtaining his degree in engineering geology in 1930. During the next eight years he worked for Transcontinental and Huasteca Oil Companies in Mexico, during which time he held various positions from junior geologist to district geologist in the fields near Tampico. In 1939 he went to Cairo for the Standard Oil Company of Egypt and for two years carried out geonogical and geophysical studies there. From 1942-44 he carried out similar studies in Costa Rica and Cuba for the Standard Oil Company of New Jersey and then returned to Egypt for a two-year period as chief geologist. In 1946-47 Mr. Wallis was assistant manager and acting manager in Ecuador for the International Ecuadorean Petroleum Company and then became exploration manager for International Petroleum Company, Ltd., with headquarters in Lima, Peru. Last December he made a trip to Venezuela and in January of the current year assumed his present position with Creole Petroleum Corporation.

Death of Col. Medlicott

Col. H. E. Medlicott, D.S.O., for many years associated with Anglo-Iranian Oil Co., Ltd., and a widely known figure in the international oil industry, passed away in April last following a prolonged period of ill health. Col. Medlicott had a long army career and received the Distinguished Service Order for bravery in the field. At the beginning of World War II, though well over military age, he obtained an appointment to the General Staff and saw service in France, including an active part in the evacuation of Dunkirk. He was a leader in the wartime activities of the oil industries. His last visit to the United States was in the winter of 1947-8 which he spent in Arizona in an effort to improve his health.

Consumption In Argentina

Production of crude oil in Argentina during 1947 according to Foreign Commerce Weekly was 21,705,000 barrels, as compared with 20,835,990 in 1946. Imports of crude oil and products for 1947 are reported as 26,733,000 barrels against 22,547,100 in the year preceding. Despite the increase of nearly 12 percent in total supply, a shortage of products prevailed, and rigid rationing measures were applied during most of the year.

Imports of products for the two years are given as follows, in barrels:

Product	1946	1947
Aviation Gasoline	154,900	149,000
Motor Fuel	8,300	569,000
Gas and Diesel Oil	532,100	647,000
Fuel Oil	14,451,800	16,853,000
Others	168,000	159,000
Total	15,315,100	18,377,000

Iran's Production

Production of crude oil in Iran for the month of March is reported as 1,803,000 tons, an average of 447,800 barrels daily. For the first quarter of the year production amounted to 5,152,000 tons averaging 436,000 barrels daily.

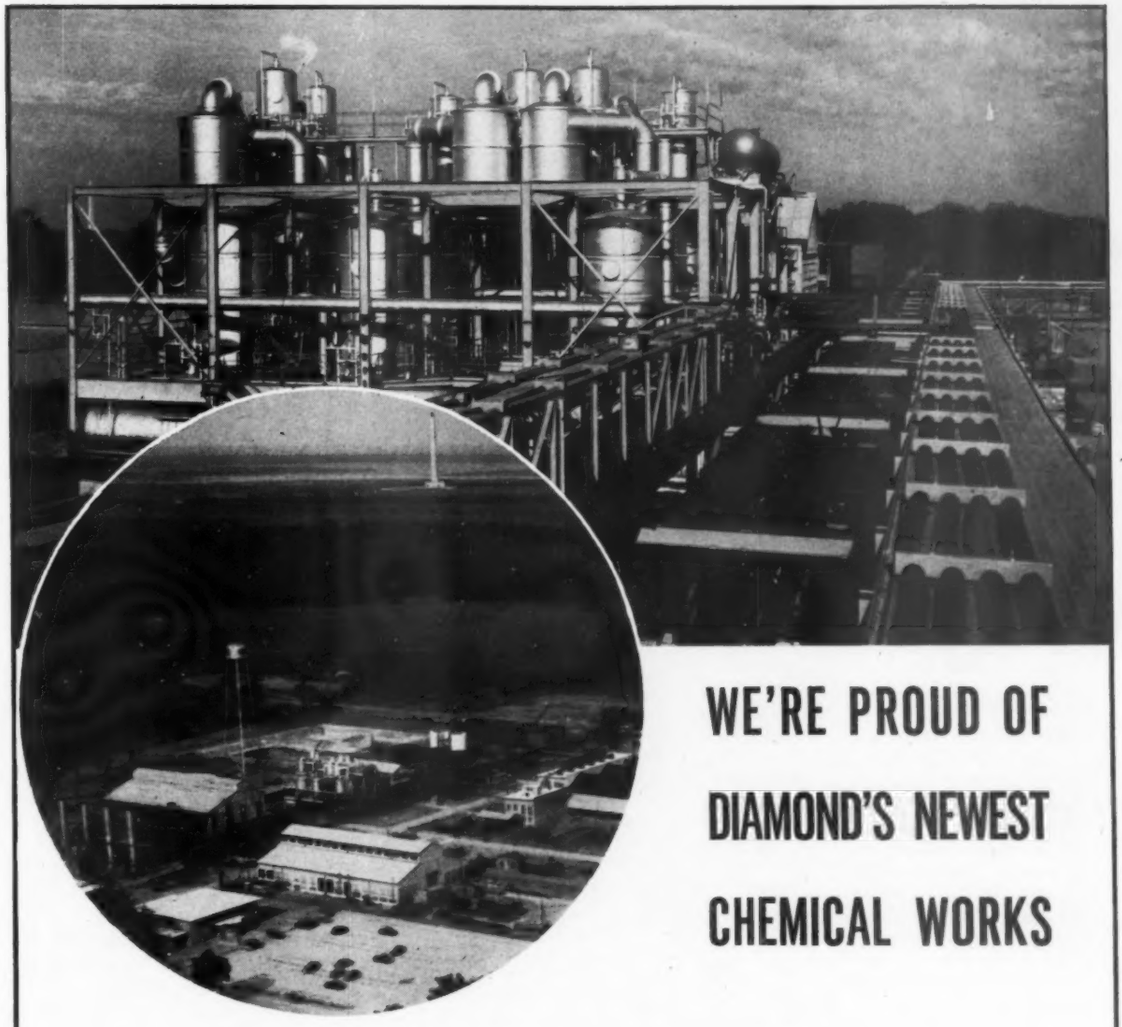
Creole Hospital at Maracaibo

A new and modern hospital to take care of the needs of approximately 10,000 employees of the Creole Petroleum Corporation and of contractors working for the company will be erected immediately at Maracaibo, according to an announcement by Dr. Alfonso Bortone, chief of Creole's medical services in western operations. Work on the new hospital began June 1, and it is scheduled for completion late in 1949. A firm of internationally known hospital architects, Crow, Lewis and Wick, of New York City, designed the new hospital. The plans call for a 115-bed building so designed that its capacity can be doubled if necessary.

The Maracaibo Creole hospital will be located in Bella Vista. Its sie was selected after the architects had carefully studied such factors as wind direction, sun orientation, drainage, temperature, rainfall and transportation facilities.

There will be at least 15 staff doctors for the hospital, 40 graduate nurses and 35 assistant nurses. It is estimated that there will be 75 other staff members. The ratio of staff to the number of beds will be 1.8—a figure which is equal to that required under the highest international standards.

Equipment in the hospital will be of the best available. There will be four operating rooms, complete x-ray, physiotherapy and laboratory facilities, and a special clinic for employees and their families. Two auxiliary electric plants will assure an ample supply of power. Meals for patients will be supervised by a graduate dietitian in modern kitchens. The hospital will have three floors connected by elevators. Ots total cost is estimated at Bs. 10,000,000.



WE'RE PROUD OF DIAMOND'S NEWEST CHEMICAL WORKS

Diamond Alkali Company's newest chemical plant, the Houston Works on the Houston Ship Channel, recently went on stream, manufacturing chlorine and caustic for what it's able young president, R. F. Evans, so aptly described as "the living, growing, expanding chemical industry." Brown & Root, Inc. are proud to have been selected for engineering and construction of this great plant—proud of the part we have in the process industry in the Southwest, which is fast securing its position as a world chemical capital.

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OIL COMPANY STAFF CHANGES

Stanley C. Hope

R. C. Brown

STANLEY C. HOPE has been elected executive vice president and director of Esso Standard Oil Company to succeed A. Clarke Bedford who is retiring. Mr. Hope is a former president of Gilbert & Barker Manufacturing Company and Stanco, Inc., affiliates of Standard Oil Company (New Jersey), and has had a broad experience in the manufacturing and sales fields.

A native of Springfield, Massachusetts, Mr. Hope started his business career with Gilbert & Barker and later on was sales manager in New York and Europe. He returned to Springfield in 1927 as vice president of the company and was elected president in 1932. In 1946 he assumed the added responsibility as president of Stanco, Incorporated, specialty petroleum products affiliate, with which he had served as director for many years. During the war Mr. Hope coordinated the work of 21 concerns making parts for automatic sighting and firing mechanisms of anti-aircraft guns for which he was cited for distinguished service by the Army Ordnance Department.

Mr. Bedford, in a 35-year career with the company and affiliates, has been active in production, manufacturing and marketing operations. Among his previous positions he has been secretary and assistant treasurer of The Carter Oil Company, Mid-Continent affiliate of Jersey Standard; vice president and director of Standard of Louisiana and president of Colonial Beacon Oil Company. He was elected a vice president and general sales manager of Esso Standard in 1943 and executive vice president and director the following year. A member of a family long prominent in Jersey Standard and its affiliates, he is the son of Alfred Bedford, former president and chairman of the board of Standard Oil Company (New Jersey).

EARLE C. FLESHER, Johnson & Flesher Drilling Co., was elected chairman of the Oklahoma City Chapter of American Association of Oilwell Drilling Contractors on May 24. Jack Abernathy, Big Chief Drilling Co., was elected vice chairman, and Harry G. Frederickson, Grayhill Drilling Co., was elected secretary of the group.

C. E. ALLEN has been elected president and director of the California Refining Co., succeeding Fred Powell, who leaves to become general manager of El Segundo, California, refinery of the Standard Oil Company of California. Mr. Allen, a graduate of the University of Washington in engineering, has been connected with California Standard for over 17 years.

R. C. BROWN has been elected vice president, director and manager of Hudson's Bay Oil & Gas Company, Ltd., a subsidiary of Continental Oil Co. Mr. Brown, whose new headquarters will be in Calgary, was formerly assistant to the manager of Continental's Rocky Mountain region of the production department, Denver, and has been an employee of Continental for nearly 24 years.

O. D. DONNELL announced his retirement as president of The Ohio Oil Company, after more than 21 years of service in that office, at the company's annual meeting May 27. He stated that he would continue as a director until his normal retirement date, Oct. 1, 1948. J. C. Donnell II was unanimously selected by the board to succeed his father. Stockholders re-elected the directorate composed of Messrs. O. D. Donnell, E. B. Redpath, J. C. Donnell II, A. M. Gee, W. B. Emery, O. F. Moore and H. C. King.

The retiring president and general manager, O. D. Donnell, has been closely associated with The Ohio Oil Company for more than half a century. His continuous employment dates from 1906, the year in which he graduated from Case Institute of Technology with a degree in mechanical engineering. Mr. Donnell first became an official of the company in 1910 when he was elected a director and appointed assistant general manager. In 1913 he was made vice president, and in 1922 treasurer. These successive increasingly responsible positions served well in training him to succeed his father as president and general manager on Feb. 7, 1927.

O. D. Donnell

The new president, J. C. Donnell II, began his permanent employment with the company in 1932 following his graduation from Princeton University. He was elected a director in 1936 and vice president a year later. He has been in charge of the company's crude oil purchases and sales. Mr. Donnell is also president and director of the Mountain Fuel Supply Co.

J. C. Donnell II

Fabian Bachrach

JOHN D. CURTIN has been elected vice president in charge of sales of the recently-organized Texas Natural Gasoline Corp. The new corporation is an affiliate of Cox & Hamon, Dallas, Texas, and is engaged in the manufacture and marketing of liquefied petroleum gas, natural gasoline and petroleum. Mr. Curtin resigned as assistant to the vice president in charge of sales of Warren Petroleum Corporation. Previously he was with Mid-Continent Petroleum Corp. for many years.

J. P. OKIE has been transferred from Shell Chemical Corp.'s Houston plant, where he was superintendent, to Shell's manufacturing operations department, San Francisco. Mr. Okie came to Shell in 1933 at the Norco refinery. He was transferred in 1935 to the Shell refinery at Suez, Egypt, where he worked for two years. In 1943 he became superintendent of operations at the Cactus Ordnance Works in Dumas, Texas, which was operated by Shell Chemical for the government and served there for 13 months prior to his assignment at Houston.

WILLIAM C. HAWK, formerly Continental Oil Co., geologist at Ventura, Calif., has been assistant division geologist at Houston. From geologist at Los Angeles, James B. Anderson has been transferred to Shreveport and promoted to district geologist. He succeeds Edgar W. Kimball, who recently went to Houston as Continental's division geologist. Promotion from geologist to district geologist moves Harry H. Hurd from Continental's home offices in Ponca City to Oklahoma City. He succeeds W. Baxter Boyd, who has been made division geologist at Fort Worth.

THOMAS E. SUNDERLAND has been appointed general counsel of Standard Oil Co. (Indiana) to succeed Buell F. Jones, who died last November. A. L. Green was promoted from senior general attorney to associate general counsel. Mr. Sunderland was general counsel of the Pan American Petroleum and Transport Company, New York, a subidiary of the Indiana company. He joined Pan American in 1940 but interrupted his business career to serve as a colonel in the Army Air Forces from the outbreak of the war to January, 1946.

On the Beam...

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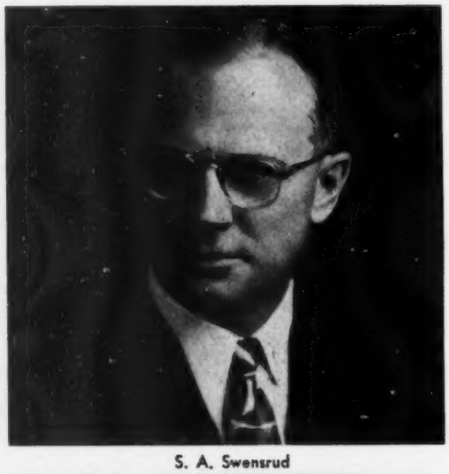
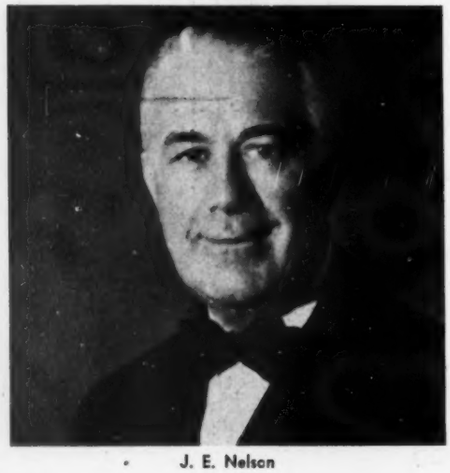


S. A. Swensrud



J. E. Nelson

AFTER forty-five years as active head of Gulf Oil Corp., W. L. Mellon has relinquished his position of chairman of the board but will continue to serve as a director. Succeeding him in the chairmanship is J. F. Drake who has been associated with Mellon interests for nearly thirty years and has been president of Gulf since 1931.

Sidney A. Swensrud is the new incumbent of the presidential post. He has been an active and prominent figure in oil industry affairs for many years. He has been executive vice president of Gulf since May 1947, coming to the company from Standard Oil of Ohio where he occupied a similar position. Other changes in Gulf management include the election of J. E. Nelson, formerly vice president and treasurer, and H. A. Gidney, former vice president and comptroller, as executive vice presidents. H. R. Moorhead, Jr., succeeds Mr. Nelson as treasurer, and W. L. Naylor takes the place of Mr. Gidney as comptroller.

Mr. Mellon's first experience in the oil industry was gained in the Pennsylvania fields. Following the sensational Spindletop discovery, he transferred his activities to Texas and became one of the organizers of Gulf Oil Corporation at its incorporation in 1907. He first served as vice president and director and in 1909 was elected president. He held that position until 1931 when he became chairman of the board. Under his leadership the company has expanded from a small local concern to a fully integrated international organization with an army of 42,000 employees.

P. L. GUARIN, chief mechanical engineer in the Shell Oil Co.'s Houston exploration and production office, was recently awarded the Legion of Merit. Presented by General Thomas T. Handy, the award was made in recognition of Mr. Guarin's able planning and supervision of a comprehensive survey of essential raw materials incident to development of the atmoic bomb. Mr. Guarin joined Shell 22 years ago as assistant mechanical engineer at Tulsa and served in various managerial and engineering capacities in Oklahoma and Texas until leaving for military service in 1942. He returned to Shell early in 1946.

L. M. MAUNEY has been appointed general superintendent of plant operations for Warren Petroleum Corp., Tulsa, Okla. Mr. Mauney joined Amerada Petroleum Corp. in 1933 and was still with that company when its gasoline plants were purchased by Warren. He was made chief chemist in 1941.

J. R. MC CREARY has been appointed assistant general manager of the crude oil purchasing department of Sohio Petroleum Company. He will remain in St. Louis. B. Ray Marshall, who has been a staff assistant in Cleveland, has been transferred to crude oil purchasing and appointed staff assistant to Vice President Wilson. Mr. Marshall will remain in Cleveland and act as liaison man and coordinator between crude purchasing headquarters in St. Louis and various Cleveland offices.

HUGH L. PATCH and A. E. Wolf have been elected vice presidents of The Standard Oil Co. (Ohio) and Ralph A. Marin, controller. Carl F. Jordan has been appointed assistant vice president. Mr. Patch will be vice president in charge of accounting; Mr. Wolf vice president in charge of finance; and Mr. Jordan assistant vice president reporting to the newly-elected executive vice president, Clyde T. Foster. Mr. Patch has been controller of the company since March of 1941. He saw service in World War I in the Engineers Corps of the United States Army.

E. FLOYD MILLER has joined Phillips Petroleum Company as special representative in the land and geological department and will be in charge of that department's newly-opened office in the Philtower Building, Tulsa, Oklahoma. Mr. Miller's assignments will cover the entire Phillips operating territory. He has been chief geologist for Bay Oil Corporation, now A. G. Oliphant, since 1933.

L. L. AITKEN, JR., has been appointed executive assistant to W. H. Ferguson, executive vice president of Continental Oil Co., Denver. Mr. Aitken has been associated with Continental as an attorney in Denver for the past ten years.

E. V. WATTS has been appointed assistant to the superintendent of the southern division of General Petroleum Corp. Don B. Priest was made assistant to the superintendent of the coastal division. A third appointment is that of A. F. Barrett to be assistant manager of Rocky Mountains operations with headquarters at Casper, Wyo.

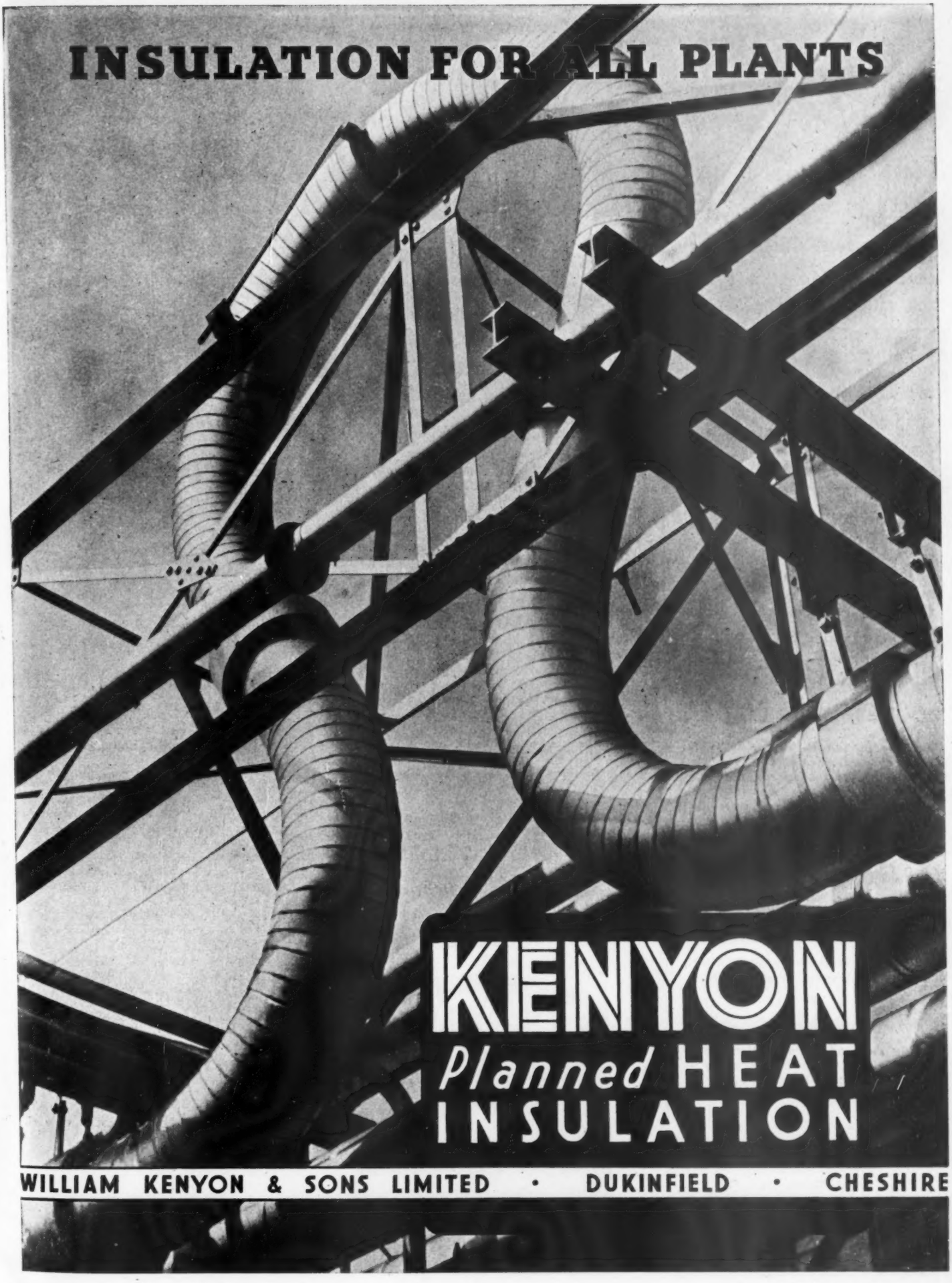
CONSTRUCTION WORK on Stanolind Oil and Gas Company's hydrocarbon synthesis plant at Garden City, Kansas, began July 1, as announced by J. E. Rouse, Stanolind vice president in charge of operations. Crews working for Stone and Webster Engineering Corp., one of the four contractors on the project, began preparing the site five miles east of Garden City as the first stage in construction. The plant will be known as the "Stanosyn" plant.

J. J. HANNA has been appointed superintendent of the Calgary, Alberta, refinery of Imperial Oil Ltd. He succeeds Clarence M. Moore who retired. Mr. Hanna joined Imperial in 1922 when the Calgary refinery was under construction. He was made assistant superintendent in 1928.

Mr. Moore was holder of a 40-year Imperial service button when he retired as superintendent at Calgary. He joined Imperial at the Sarnia plant and in 1916 supervised construction of the Regina refinery. He was superintendent at Calgary from the time construction was begun.

A. G. Stewart, formerly process supervisor at Calgary, was promoted to assistant superintendent to succeed Mr. Hanna.

PROMOTION of five veterans of General Petroleum's pipeline department whose total service with the company reaches 138 years was announced recently by J. L. Martin, newly-appointed director of that department. G. H. Supple, who has been with the company 23 years, is named manager of the pipeline department; and Laurence Andrew, a 35-year veteran, becomes general superintendent. Other appointments are that of V. C. Larsen, 29 years, to be assistant general superintendent; C. W. House, 26 years to be superintendent of the nothern division with headquarters at Taft; and L. L. Tarne, 25 years, who is named assistant superintendent of the southern division.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Guests Of New York Charter

At the May meeting of New York Chapter of Nomads a number of guests from abroad were in attendance. Shown in the accompanying illustration (left to right) are Roy Sears of Standard Vacuum Oil Company, Netherlands East India; William G. Nicholls, Kuwait Oil Company, Kuwait; J. A. Dahlgren, Socony-Vacuum Oil Company, Venezuela; Carlos R. Vegh Garzon, Uruguay, president of the South American Institute of Petroleum.

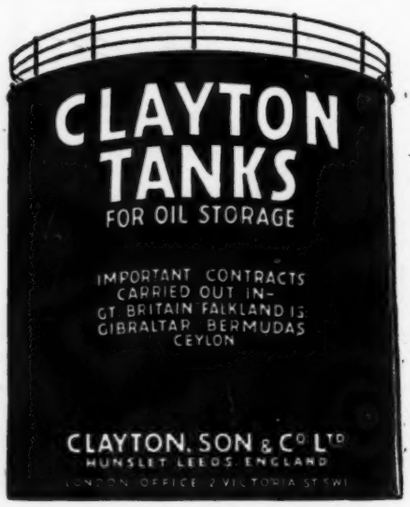
Coleman of Petreco Returns to Army

Thomas V. Coleman, Jr., design engineer for Petroleum Rectifying Co. at Long Beach, Calif., has recently been called back to active duty. Coleman holds the rank of captain and will return for service with the Signal Corps Headquarters at Ft. Monmouth, New Jersey.

Awarded Honorary Degree

Philo W. Parker, chairman of the Standard-Vacuum Oil Co., was awarded an honorary doctor of laws degree by Colgate University during commencement ceremonies at Hamilton, New York, on June 14. He is a graduate of Colgate, class of 1912, and a member of Phi Beta Kappa. In presenting Mr. Parker for the award, Dean Carl A. Kallgren of Colgate said of him: "He is an eminent leader in business and foreign trade—a true internationalist. He has upheld the principle of freer world trade as a means of improving living standards for people everywhere. Throughout the war the organization he helped build and which he now directs played an important role in aiding our armed forces to achieve victory in the Pacific."

Mr. Parker joined the first training class for foreign service offered by the Standard Oil Co. of New York. Assigned to China, he held various posts throughout South China and the Philippines until 1926 when he was made general manager at Hong Kong. In 1931 he was named director and the following year vice president. Soon after the formation of Standard-Vacuum Oil Company in 1933, he was elected president, a position he held until 1946 when he became chairman of the board.



Appointed Exploration Manager

Dr. Verner Jones is now manager of the exploration department of Socony-Vacuum Oil Company of Venezuela. He was born in Radnor, Ohio, and educated at Ohio Wesleyan College. He was instructor at Cornell University from 1930 to 1934, and during these years obtained M.A. and Ph.D. degrees there. In 1934 he began a three-year period in South America for the Standard Oil Company of Argentina. From 1937 to 1942 he was district geologist for the Magnolia Petroleum Company, a subsidiary of Socony-Vacuum. In 1946 he went to Spain for Socony as manager representative and remained there for a period of 15 months. In October 1947, he went to Venezuela to head Socony's exploration department. During the war, Dr. Jones served as Lieutenant-Colonel in the U. S. Army Airforce.

R.W.Cypher

Cypher Heads New Company

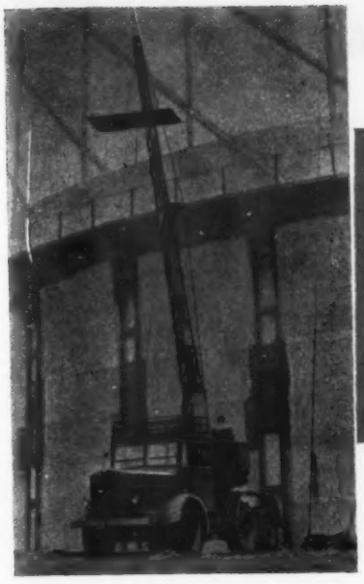
Robert W. Cypher, formerly with the sales organization of the Patterson Ballagh Division of Byron Jackson Company, now heads his own company, The Cypher System, Inc. The new organization is engaged in the manufacturing and marketing of a system for the control of electrolysis in oil wells and has its main offices and service facilities in Long Beach, California.

The Cypher System consists of a mixing unit placed at the bottom of the well controlled by electrical measurements to insure continued high resistivity of the well fluid. Tests and experiments conducted by research personnel during the past year and a half have proved the utility of the system for controlling electrolysis in even the highest brine content wells and thereby reducing replacements to a minimum.

Texas Using Television

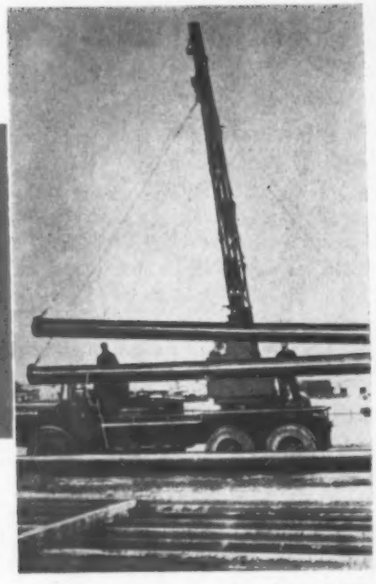
Acting on the belief that the spread of television affords an opportunity to satisfy the public appetite for a form of theatrical fare that has long been popular, The Texas Company has added to its publicity program a televised vaudeville show. The entertainment fills an hour-long period once a week on a circuit covering seven eastern cities, but its extension to other parts of the country is projected as facilities become available.

Television is considered ideally suited for the presentation of the kind of acts that made vaudeville popular a generation ago, such as song and dance teams, impersonators, magicians, jugglers, aerial, animal and musical acts. Kudner Agency originated and developed the feature.



Erecting Petrol Storage Tank in Iraq.

Handling General Stores



Oil Pipe Lines being lifted into position.

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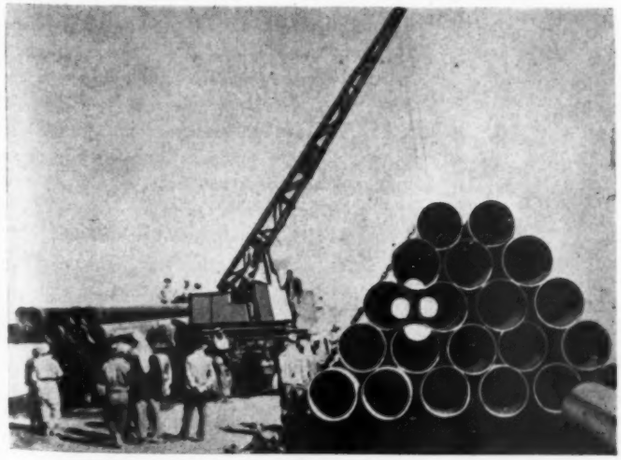

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MONTEBELLO WELL AGAIN PERFORATED AFTER 15½ YEARS

ON the afternoon of June 18 a group gathered about Union Oil Co.'s La Merced No. 17 in the Montebello field in California to watch the 100,000th gun perforating job to be completed by the Lane-Wells Co. An item for Robert L. Ripley is that the shooting was done in the same well in which the first commercial Lane-Wells perforating job was done 15½ years earlier. In the intervening years Lane-Wells had perforated 99,998 other wells and now were back to do another job on La Merced No. 17.

When the well was perforated the first time, it seemed to have completed its useful life as a producer and was marked for abandonment. After perforation the well went back on production and in the next 15½ years produced 75 percent as much oil as it had previously yielded. Now with another perforation job it is expected to go back on production for a third lease on life.

A good many of the same men who watched the first job were back on the scene June 18 to see the 100,000th job. Included in the group were Samuel Grinsfelder of Union Oil and for Lane-Wells, Rodney S. Durkee, president; James D. Hughes, sales manager; Norman Dorn, chief engineer; Morton T. Higgs, manager of field operations, and James W. McPhee, manager of the California division. George F. Turechek, chief design engineer for Lane-Wells, shot La Merced in 1932 and was back on the job again in 1948 with the same helpers, "Bill" Allen, "Doc" Stewart and "Marty" Reitzel.

The problems involved in successful gun perforating are many. First, of course, are the obvious problems of the physical properties of steel. The exact shape and composition of the "steelflo" bullets have been the subject of years of experiments, laboratory and field tests. The obvious answer to the need for deep penetration —just pack more powder behind the bullet— defeats itself in actual use. All projectiles have a natural tendency to "tumble," to turn butt-end first. This tendency cannot be cured in a gun perforator as it is in a rifle; the barrel is of necessity very short, and it is almost impossible (is for practical purposes quite impossible), to provide rifling to spin the bullet and hold it true in flight. Hence, the most careful balance is demanded between bullet, barrel, chamber and propellant. Too great a charge merely augments the end-over-end tendency of the bullet, which then tumbles and fails to give proper penetration. It's something like using high-octane gas in a low-compression motor— the performance is not improved, appreciably, but the motor takes a terrific beating.

The demands on the powder used in gun perforating are perhaps greater than on powders used in regular ordnance. The correct "compaction" and speed of burning are of critical importance, and when you add to that the conditions under which that powder must function, you come up with a very nice problem indeed. Down-hole conditions of fluid, hydrostatic pressure and high temperature provide a set of conditions which few explosives are ever asked to face. To meet these conditions Lane-Wells uses two different powders for different down-hole temperature ranges, both packed in fibre containers with electric ignition wires buried inside the powder mass to avoid misfires.

To insure safety, Lane-Wells has developed a five-point firing system which requires the simultaneous action of both the shooter at the control panel in the truck and the rig man on the derrick floor, and is so arranged that neither the made-up charges or the gun itself is ever "live" except when it has been positioned in the well at the exact location which is to be perforated. It should be noted that the powder

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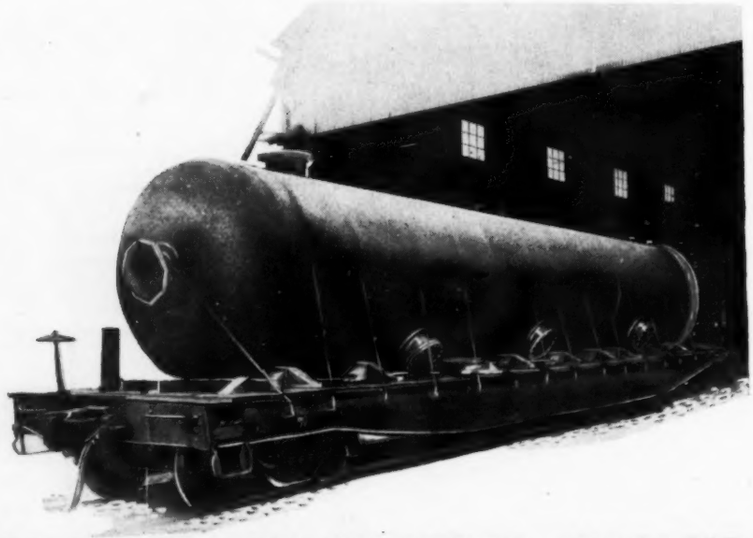

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is a cellulose nitrate base powder which cannot be detonated by dropping or other shocks from careless handling.

While gun perforating was developed for the purpose of bringing in production, it has today a host of other associated uses. It is frequently called on to perforate for squeeze cementing, for testing water shutoff, for multiple zone testing and completions and for other uses. One of its major uses today is that of perforating before acidizing. The funnel-shaped holes left by the bullets in limestone or sandstone provide an ideal condition for the action of the acid in opening drainage channels in the formation, since the sides of these holes are a maze of cracks and fissures which allow the acid to penetrate far more deeply than is possible when it can work only on the face of the formation.

During the fifteen and a half years on its first 100,000 jobs, Lane-Wells has fired more than five million bullets. No possible estimate can be made of the steel saved by use of single-string completions made possible by gun perforating, but it has been estimated that gun perforating has been responsible for the production of over 200,000,000 barrels of oil which would have been unrecoverable by any other method of completion.

Santa Fe Tank Promotes Kuehmsted

A. M. Kuehmsted

A. M. Kuehmsted, until recently in charge of the New York office of Santa Fe Tank & Tower Co., has been recalled to Los Angeles to head the company's expanding cooling tower division. Mr. Kuehmsted has been connected with the company for the past 12 years and during the war was in charge of wood tank production for the armed forces. Herbert Kunan succeeds him in charge of the New York office.

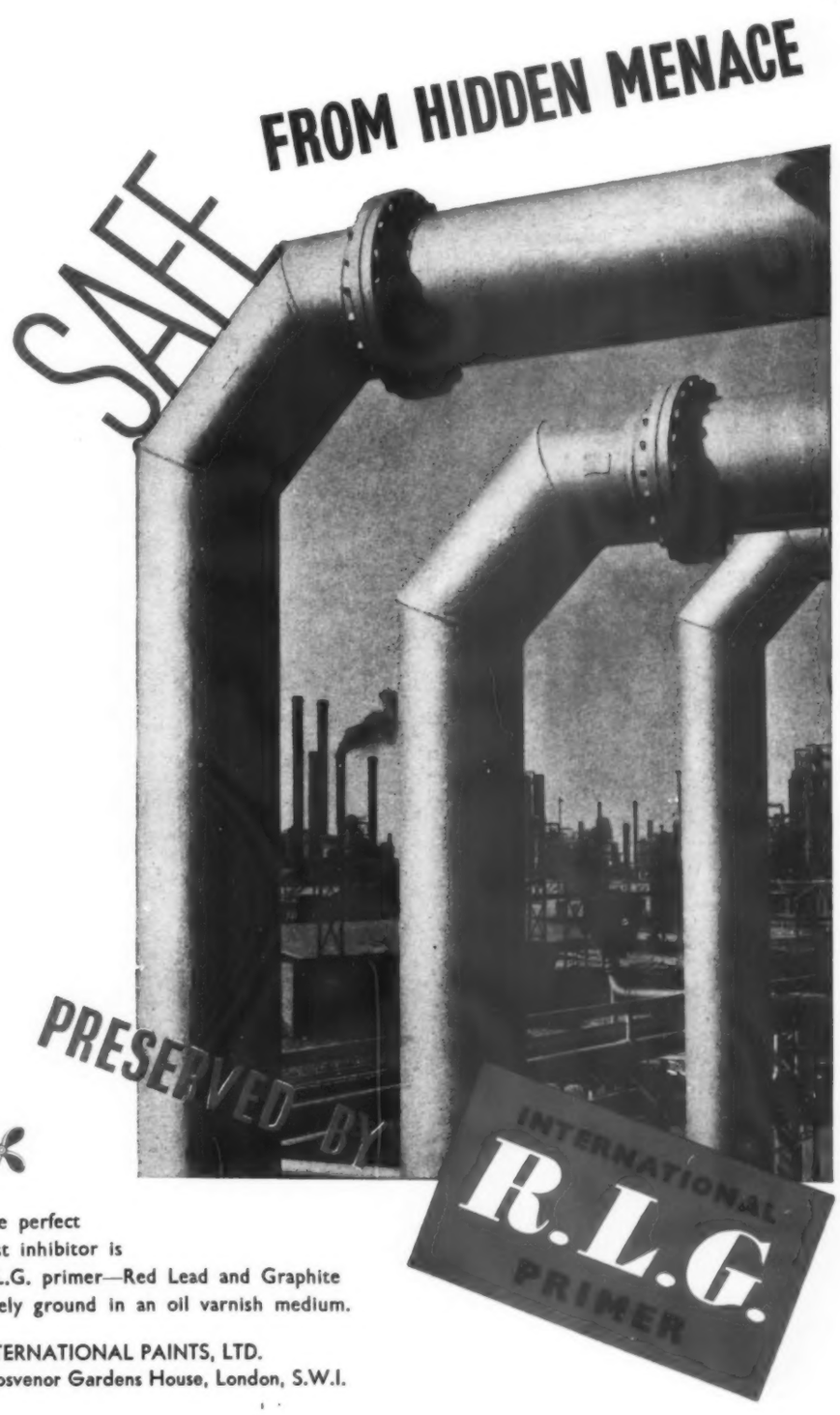
Promotions by Continental Supply

F. M. Mayer, president of Continental Supply Company, has announced promotions of three executives of the company. Noble A. Endicott, formerly sales manager, has been elected vice president in charge of Gulf Coast operations with headquarters at Houston. He entered the employ of Continental in 1916 and for a number of years was engaged in field operations. Since 1936 he has been located at the general offices in Dallas, first as assistant manager of sales and from 1942 as sales manager.

D. D. Dellinger, treasurer of the company since 1940, has been made vice president in charge of finance and will continue to serve as treasurer. Jack A. Mussler has been appointed general manager of sales, a newly-created position. He came to Continental in 1935 from Youngstown Sheet & Tube Co. after 12 years of service in the sales division of that company in the United States, Europe and the Middle and Far East. After joining Continental, he was made a district manager of tubular sales and since 1939 has been manager of the tubular division.

BERNARD R. CARNEY has been made manager of the gas division of Warren Petroleum Corp., it was announced by J. A. LaFortune, executive vice president. He assumed his new duties June 1, 1948, returning to Tulsa from Amarillo, Texas, where he had been assistant to the president of Shamrock Oil and Gas Co. Mr. Carney brings to this position a background of more than 20 years' experience in refinery and natural gasoline plant operations.

After five years in the manufactured gas industry, he joined the old Roxana Petroleum Corp. as a draftsman at the time a refinery was being constructed at East Chicago. He was assigned to various technological work after the plant was placed in operation and in January, 1931, was made chief technologist. After various assignments he came to Mid-Continent in 1938 as assistant to the gas-gasoline division manager of Shell Oil Company, Inc., with headquarters in Tulsa. He was promoted to manager of that division in January, 1940, and held that position until his resignation May 1, 1945.



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Lee C. Moore

A study in contrasts at the recent International Petroleum Exposition in Tulsa. In the foreground is the world's smallest rig, a portable shot-hole unit designed by Engineering Laboratories, Inc., which can be carried on a man's back into areas otherwise inaccessible.

In the background is the world's tallest rig, a Lee C. Moore derrick with an overall height above ground of 212 feet. The Lee C. Moore derrick was displayed by Bethlehem Supply Co. and was one of seven Moore derricks and masts shown by various exhibitors. Another one of the oversized Moore derricks was displayed by Mid-Continent Supply Co. In discussing the Bethlehem and Mid-Continent exhibits in the May issue, WORLD PETROLEUM neglected to point out that the special derricks for today's deep drilling had been built by the Lee C. Moore Co.

Individuals shown in the photograph are (left to right), J. L. McLendon, vice president of Engineering Laboratories; Marshall Ragan, designer of the tiny shot-hole rig; W. M. Wells, assistant E. L. I. sales manager; G. L. Reese and J. V. Spalding, Bethlehem sales engineers.

Attack by Motilones

Motilone Indians recently made an attack on the South Perija geological party of the Caribbean Petroleum Company and wounded two men, Jesus Angel Paz and Severina Marquez. The party of ten workmen, headed by Dr. H. W. Loser and Kiewiet de Jonge, had been clearing a new campsite on the Rio Santa Rosa de Agua Blanca, about 165 kms. southwest of Maracaibo, Venezuela, and some 25 kms. east of the Colombian border, and they were returning to the base camp at 5:00 P.M. when the attack occurred. From two ambushes near the trail, improvised from palm leaves, about a dozen Indians made the attack. The wounded men were transported on stretchers to the mission of the Capuchinos and then on to La Cueva. From there a power wagon of a Creole gravity party took them to Machiques where a doctor was available and finally to the Caribbean Petroleum Company hospital in Maracaibo. Only one of the men survived.

Celebrates 100th Anniversary

The Watson-Stillman Co., Roselle, N. J., recently celebrated its 100th birthday as a manufacturer of equipment for production industries. In an address to the management group during the celebration, Edwin A. Stillman, company president, said that sale of forged steel valves and fittings is taxing plant capacity and it is anticipated the production of such items will remain at a high level for several years.

Watson-Stillman was organized in New York in 1848 and moved to Roselle in 1904. The company has continued under management of direct descendents of the founder during the entire 100 years. The company now employs 800 workers.

H. T. ASHTON, regional manager at St. Louis for Socony-Vacuum Oil Co., Inc., was awarded the honorary degree of Doctor of Science by his alma mater, Miami University, Oxford, Ohio, at its recent commencement. Mr. Ashton has been engaged in the oil business since 1913 when he joined a Pure Oil Co. predecessor company at Columbus, Ohio. He resigned from Pure Oil in 1922 to become vice president of Lubrite Refining Co. at St. Louis. This company subsequently was bought by Socony-Vacuum and became its Lubrite division. Mr. Ashton is president of the Western Petroleum Refiners Association and has been active in this organization and the American Petroleum Institute for many years.

H. T. Ashton

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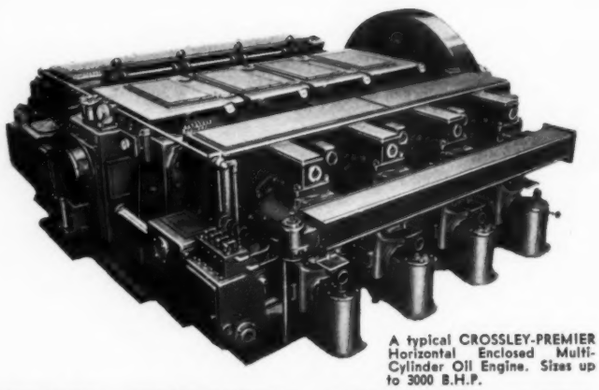

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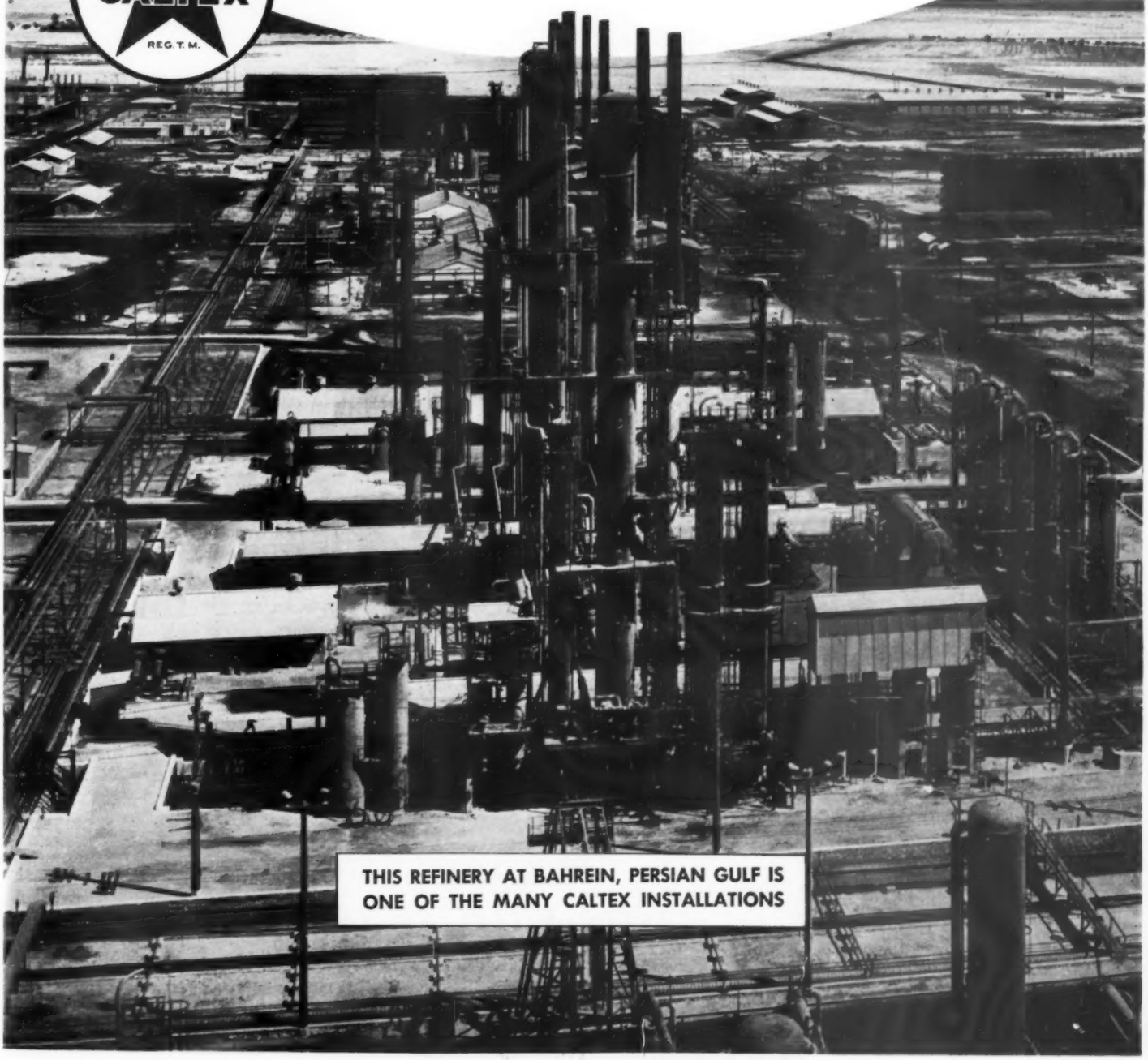

THIS REFINERY AT BAHREIN, PERSIAN GULF IS ONE OF THE MANY CALTEX INSTALLATIONS

E. O. Perkins

E. O. PERKINS, general superintendent of the terminal division of The Texas Company since 1944, has been appointed assistant general manager of the company's marine department. Joseph T. Froehlich succeeds Mr. Perkins as general superintendent of terminals.

Mr. Perkins, born in Emporia, Texas, started with Texaco in 1920 as a stenographer at the company's refinery in Port Arthur, Texas. He was transferred to the terminal division in 1931. Mr. Froehlich was born in Brooklyn and began his business career with The Texas Company in 1929 as a draftsman in the engineering department. He became assistant general superintendent of terminals in 1944.

Venezuelan Production

Production of crude oil in Venezuela during the month of April amounted to 39,083,054 barrels, an average of 1,302,768 barrels daily. As compared with March, this daily average is lower by 11,302 barrels. Exports for the month were 38,168,814 barrels. Production by companies is shown in the following table:

Company	West	East	Total
Creole	14,226,450	4,814,395	19,040,845
Mene Grande	1,702,311	4,683,624	6,385,935
Shell	11,879,294	.....	11,879,294
Consolidada	.....	563,871	563,871
Socony	.....	901,752	901,752
Texas	.....	115,618	115,618
S.A.P. Las Mercedes	.....	91,946	91,946
B.C.O.	33,752	.....	33,752
Orinoco	9,314	.....	9,314
Phillips	.....	55,844	55,844
Atlantic	.....	4,883	4,883
Total Barrels	27,851,121	11,231,933	39,083,054

JOHN W. BARKER, formerly of Houdry Process Corp. and Foster Wheeler Corp., has joined the engineering staff of George Armistead, Jr., consulting chemical engineer of Washington, D. C. A graduate of MIT in 1941, Barker has specialized for several years in the design and engineering of refinery process units as well as the supervision of pilot plant research. He will serve in a general engineering capacity in the various services rendered by the Armistead organization.

Stanolind's Drilling Program

Stanolind Oil and Gas Company has announced that it will drill during 1948 on its own account or in participation with others, 948 wells. The cost of the program is calculated as about $69,000,000. This compares with 844 wells in 1947 at an expenditure of $50,600,000.

Included in the year's drilling program are 100 wildcats. Four of these are in the open waters of the Gulf of Mexico. The average cost of wells drilled this year is expected to be $72,600 as compared to an average of $60,000 in 1947.

EDWIN L. FETZER has joined the staff of Southern Geophysical Co., Fort Worth, Texas, Dr. Sidon Harris, president of the company, has announced. Mr. Fetzer has been with National Geophysical Company in Dallas the past 11 years. He will supervise the work of several seismograph crews of Southern Geophysical Company in West Texas.

Edwin L. Fetzer

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● *Lincoln are using a daylight cinema at the Machine Tool and Engineering Exhibition, Olympia, 26 August —11 September, 1948. A continuous programme of documentary talkies, most of them in Technicolor and one by Walt Disney, shows classical examples of cinematic training and technical education.*

● *The films deal with such subjects as the general application of welding, designing structures for arc welding, distortion, arc welding in agriculture and the designing of arc-welded machinery. They may be borrowed by technical institutes and individual companies.*

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Oils' Outlook in Former India Uncertain

(Continued from page 49)

those already known in Assam, or it must import on a still larger scale. The present attitude of the government in India appears to be that it is anxious to develop its resources in general by the employment on such projects of its own nationals without external aid. If that policy is continued, it is very doubtful whether there will be any substantial increase in the petroleum production of India for many years to come, but rather a gradual decrease of present production will take place.

Pakistan, as has been shown, has a present a much smaller petroleum production than India, and a glance at the accompanying map will also show that it has less territory vailable for exploration. On the other hand, it is believed that the potentialities in the northwest sections are more promising than elsewhere. Exploratory drilling has been carried out in Baluchistan, but the results have not been revealed, and it is understood further work is in abeyance.

It probably will be found in the future that the government of Pakistan, knowing its own limitations and the limitations of its nationals, will be more inclined to join hands with foreign interests in the exploitation of its natural wealth with enhanced prospects of success. In the meantime it must be an importer of petroleum for its domestic requirements.

J. L. Martin

J. L. MARTIN has been elected a director and vice president of General Petroleum Corp., Los Angeles, in charge of the pipeline department. He succeeds E. L. Adams who has retired after 36 years with the company. Mr. Adams has been a company director since 1932 and a vice president since 1936.

Mr. Martin has been superintendent of the pipeline department since 1932 and has been with the company since 1913, when he was made assistant pipeline superintendent at Taft.

Fuel Reconversion

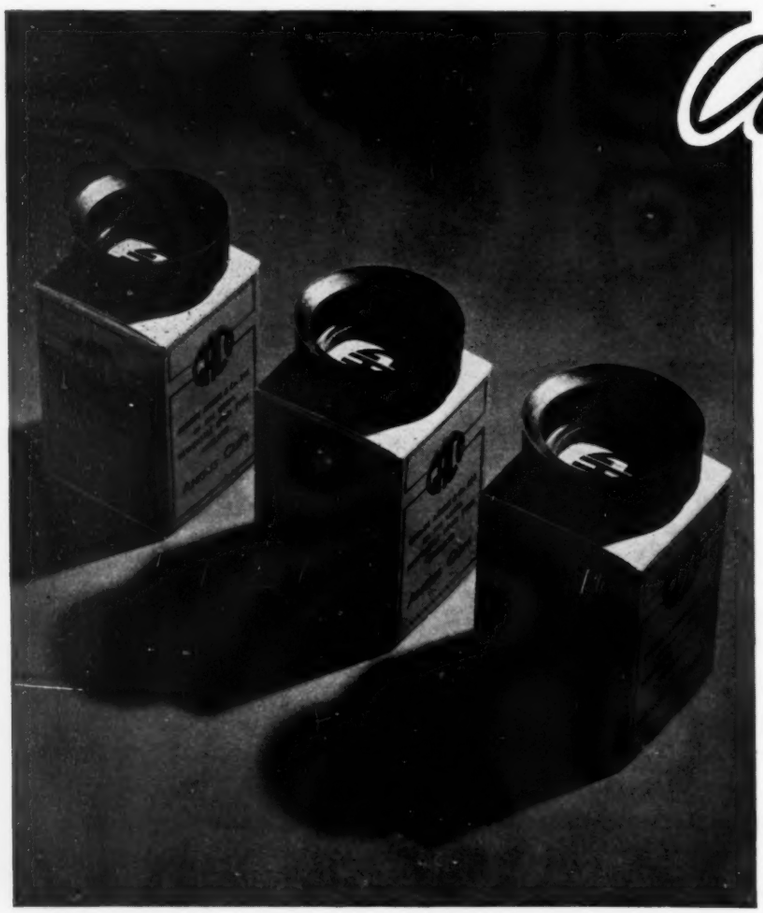
There is evidence in Britain that fuel oil conversion work is now operating in reverse and that some of the work already done will be undone, if not immediately, then as quickly as facilities permit. A typical instance here is the policy of conversion of main-line locomotives to fuel oil consumption. Instructions now have been given, it is understood, by British Railways that not only must conversion stop but that converted locomotives must revert back to coal.

Coal production has improved so fast, although still below desired levels, that the government has abandoned its policy of utilization of oil. The increasing difficulties in the oil supply position have contributed, of course, to this decision. Even though there are plans for an enormous expansion of production by British companies, there is still a very positive belief that Britain must rely on coal rather than on oil fuel.

This does not in any way hamper fuel oil burning equipment manufacturers who declare that they still hold a very considerable volume of business from overseas consumers and particularly from those countries—South America, Middle East, Iran—where oil is a natural fuel. The marine program also continues largely unhampered by the current trend in the market, since foreign bunkering is immensely simplified and more economic.

Baroid Moves Export Office

The export department of Baroid Sales Division, National Lead Company, has been moved from Los Angeles to City National Bank Building, Houston, Texas. All inquiries and orders relating to export will be handled through the Houston office which is in the charge of J. F. Herold, export manager, and L. E. Jensen, chief clerk.



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